

## 308 nm excimer laser phototherapy of psoriasis: Monotherapy versus combination with Calcipotriol therapy

Klaus Fritz\*

*Dermatology and Laser Center, Reduitstr. 13, 76829 Landau, Germany*

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### Abstract

**Objective:** Aim of the present investigation was to prove whether a combination therapy using 308 nm excimer laser phototherapy and topical Calcipotriol application is more effective than a monotherapy to treat stable plaque psoriasis.

**Material and methods:** In a one center open trial, 36 patients (21 men, 15 women) with stable, moderate to severe, plaque-type psoriasis vulgaris received 308 nm UVB dose of 200–1200 mJ/cm<sup>2</sup> to affected areas, delivered by an 308 nm XTRAC<sup>TM</sup> XeCl excimer laser (PhotoMedex, Radnor, PA, USA).

One side of either, back, leg or arm was additionally treated with Calcipotriol ointment twice daily, starting 0–7 days before the treatment with the 308 nm laser. The other side was treated with the 308 nm laser and Vaseline only. To evaluate the efficiency of both therapy concepts, a modified Psoriasis Area and Severity Index (PASI) score was calculated, which was initially found to be 31 per side on average.

**Results:** Clearing of infiltration, erythema and scales was achieved at 25% after 2 sessions for the excimer laser treated side without Calcipotriol, and 40% in the Calcipotriol plus excimer laser treated side.

**Discussion:** With the 308 nm excimer laser (FDA approved), higher doses of UVB can be administered to the psoriatic plaques while sparing the non-affected skin. Plaques clear faster in fewer sessions at a lower cumulative dose. The combination of 308 nm excimer laser phototherapy with Calcipotriol improves the reduction of infiltration and scales of psoriatic plaques considerably. Compared to narrow-band UVB monotherapy, the narrow-band UVB plus Calcipotriol treatment needed fewer sessions of excimer laser treatment, fewer days to achieve a reduction of the PASI parameter and a lower cumulative dosage.

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**Keywords:** Excimer laser; Calcipotriol; Psoriatic plaques; UVB

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### Introduction

Benefit from phototherapy is increased when used in combination with systemic or local therapies. Greater improvement occurs with fewer treatments.

Evidence-based data on the efficacy and safety of combination treatments are on the increase. A questionnaire-based study of 5739 members of the psoriasis associations in Scandinavian countries showed that the two most commonly used active agents were topical steroids (89.7%) and Calcipotriol (73.1%) [1].

In particular, the combination with Calcipotriol has shown to be very effective and safe. A combination of systemic treatments is controversial [2].

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\*Tel.: +49 6341 20006; fax: +49 6341 83412.

E-mail address: [DrKlausFritz@t-online.de](mailto:DrKlausFritz@t-online.de).

Kragballe [3] described clearance of psoriasis plaques after 8 weeks with Calcipotriol treatment twice daily in 17% of 20 patients, but in 39% of the cases after an additional UVB radiation three times per week. Severity and improvement are measured as a Psoriasis Area and Severity Index (PASI) score.

Kerscher et al. [4] reported a PASI reduction after 2 weeks in 35% of patients receiving Calcipotriol monotherapy twice daily compared to 68% of patients with additional 311 nm UVB radiation 5 times per week. Using a similar study protocol for the treatment of 101 patients, Molin [5] reported a PASI reduction after 8 weeks of 82% after application of the combination treatment on one body side versus 70% for the other body side, which were treated with Calcipotriol only. Ramsay et al. [6] treated 168 patients three times per week with UVB and twice daily Calcipotriol ointment on one side and the same UVB but vehicle cream on the other side. PASI reduction of 80% required less UVB radiation on the combination side ( $1570 \text{ mJ/cm}^2$ ) versus UVB monotherapy ( $5430 \text{ mJ/cm}^2$ ).

Several authors have shown that narrow-band UVB, which is comparable to the wavelength used in the excimer laser, combined with local Calcipotriol, Calcitriol and Tacalcitol treatment reduces cumulative dosage and therefore time, costs, risks and allows a much faster onset of clearing [3,7,8].

So the question was, whether the 308 nm excimer laser treatment can achieve better results with lesser treatments if combined with topical Calcipotriol ointment two times per day in order to save time and costs and cumulative dosage.

## Subjects and methods

### Patients

In a one center open trial, 36 patients (21 men, 15 women) with stable, moderate to severe plaque-type psoriasis vulgaris received 308 nm UVB dose of  $200\text{--}1200 \text{ mJ/cm}^2$  to affected areas, delivered by an 308 nm XTRAC<sup>TM</sup> XeCl excimer laser (PhotoMedex, Radnor, PA, USA).

Informed consent was obtained from each study participant. Subjects needed to be 18 years or older, non-pregnant, with modest to severe plaque-type psoriasis. Subjects had to be off topical treatments for at least 2 weeks prior to the start of the study. Any UVB phototherapy had to have been stopped for at least 4 weeks prior to entry. Systemic treatments such as psoralen UVA (PUVA) treatment, methotrexate, cyclosporin, hydroxyurea or systemic retinoids, required an at least 8-week washout period. Subjects with a

history of photosensitive disorders or those on medication known to cause photosensitivity were excluded.

### Therapeutic procedure

In the same group of patients, one side of either, back, leg or arm was treated with Calcipotriol ointment twice daily, starting 0–7 days before the treatment with the 308 nm laser. The other side was treated with the 308 nm laser and vaseline. Severity and improvement are measured as a PASI score. For comparison of the two differently treated sides, the PASI score can be modified and does not include the percentage of involved area of the whole body. It is calculated in the same way but limited to the parameters “infiltration, scales, erythema”. The initially calculated, modified PASI score per side was 31 on average. The excimer laser treatment was applied twice weekly starting with a dose of  $200 \text{ mJ/cm}^2$ . The fluence was continuously increased in the following laser sessions according to the development of erythema, i.e. by 100–150 mJ (no erythema occurred after initial treatment), by 50 mJ (persistent erythema for 24 h after initial treatment) or no increase (persistent erythema for more than 24 h after initial treatment).

## Results

Clearing, i.e. reduction of infiltration, erythema and scales, was achieved at 25% (PASI score reduction from 31 to 23 on average) after two sessions on the excimer laser treated side without Calcipotriol, and 40% (PASI score reduction from 31 to 19 on average) on the Calcipotriol plus excimer laser treated side (see Table 1). Overall, an average of eight sessions was needed to reach a clearing of more than 80% (see Fig. 1). At the end of the treatment, after 6–10 sessions, the excimer laser treated side, without Calcipotriol application, showed a reduction of the PASI score from 31 to 5 (85%). The Calcipotriol plus excimer treated side showed a reduction of the modified PASI score from 31 to 3 (91%).

In summary it can be stated, that the excimer laser treatment, which allows faster clearing than phototherapy, can be further improved by use of topical Calcipotriol (see Figs. 2–4).

## Discussion

Psoriasis affects more than 3% of the population and inflicts suffering on the lives, psychological and social well-being of the patients.

Both UV-phototherapy without sensitizers and psoralen photochemotherapy (PUVA) are well established in the treatment of psoriasis, however, they are time

**Table 1.** PASI during treatment

Patient no.	Combined laser/Calcipotriol therapy			Monotherapy (excimer laser treatment only)		
	Initial	After 2 sessions	At end of treatment (6–10 sessions)	Initial	After 2 sessions	At end of treatment (6–10 sessions)
1	45	44	2	55	28	6
2	45	33	3	45	28	7
3	45	28	4	44	28	5
4	44	28	3	44	28	6
5	44	24	4	44	24	7
6	44	24	2	40	24	5
7	40	24	3	40	28	6
8	40	24	4	40	24	5
9	40	21	4	36	24	6
10	36	21	3	36	24	3
11	36	21	2	36	22	4
12	36	21	3	33	22	5
13	33	20	3	33	24	7
14	33	20	2	33	22	3
15	33	20	4	33	22	6
16	32	20	3	32	24	4
17	32	18	3	32	18	7
18	32	18	2	32	20	6
19	32	18	3	30	28	5
20	30	16	4	30	20	5
21	30	16	3	30	22	3
22	30	16	3	30	20	4
23	30	15	4	27	18	3
24	27	15	3	27	22	5
25	27	15	3	27	24	3
26	27	15	1	24	18	4
27	24	14	2	24	24	3
28	24	14	3	24	28	3
29	22	14	3	22	24	5
30	22	14	2	22	24	7
31	22	12	3	20	24	5
32	20	12	2	20	18	5
33	20	12	3	20	24	3
34	20	12	2	18	24	4
35	18	10	2	18	24	4
36	18	10	2	18	18	3
Average	31.5	18.9	2.8	31.1	23.3	4.8
Improvement	–	40%	91%	–	25%	85%

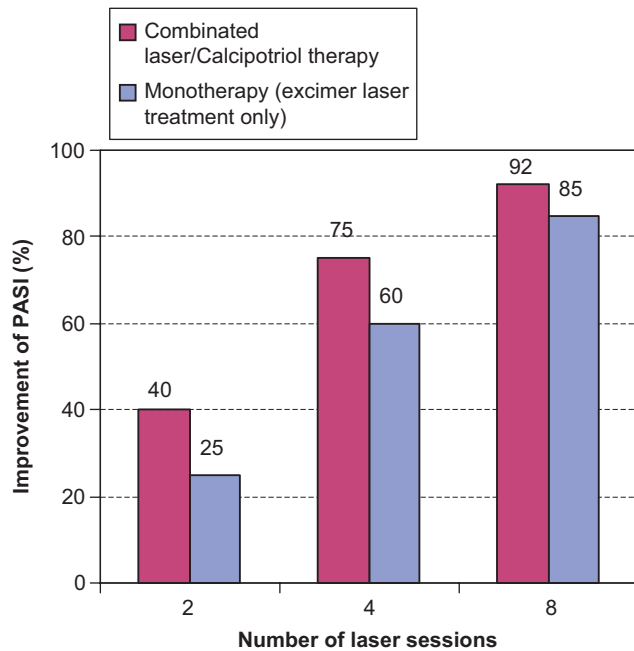
consuming. The average therapy regimen is 50–100 days and 20–50 sessions and the onset of first clearing takes 4–5 weeks [9–11]. Suberythemogenic narrow-band UVB (NB-UVB) is markedly more effective than conventional UVB in the treatment of psoriasis vulgaris [12].

In many patients with plaque-type psoriasis, NB-UVB is comparably as effective as PUVA, shows less adverse reactions and the possibly lower long-term cancer risk [13].

Any phototherapy can enhance the risk of skin cancer. Efforts to reduce the cumulative dosage should be made,

although the evidence available is insufficient for quantifying excess incidence of skin cancer in patients with psoriasis who have been treated with UVB radiation, i.e. at what level of exposure this occurs, or how long after exposure excess risk is present. It would seem that the excess risk exceeds 2% per year [14].

In contrast to traditional phototherapy techniques, it is possible to clear psoriasis with the 308 nm UVB excimer laser in 4–10 sessions. More than 40% reduction of PASI can be achieved in 2–4 sessions or 7–10 days [15–21].



**Fig. 1.** Average improvement for both therapy concepts after 2, 4 and 8 laser sessions.



**Fig. 2.** Psoriatic plaques before treatment.

In a multicenter study [18], adults were treated with stable, mild to moderate plaque-type psoriasis vulgaris. The 72% (66/92) achieved at least 75% clearing on an average of 6.2 treatments. The 84% of patients (95% confidence interval, CI = 79–87%) reached  $\geq 75\%$  improvement after  $\leq 10$  treatments. We were able to confirm this result. In our study with 36 patients, a clearing of 40% or more after 2.3 sessions on average was achieved applying a combination of Calcipotriol and UVB radiation. At the end of the treatment, after 6–10 sessions, the PASI on the sides treated with the combination was reduced by 91% compared to



**Fig. 3.** The same patient. The left side was treated with excimer monotherapy; remaining psoriatic plaques are seen. On the right side, after 7 laser sessions in combination with a Calcipotriol therapy, no more psoriatic plaques were observed but unusual hyperpigmentation occurred.



**Fig. 4.** The same patient at the end of treatment.

an 85% reduction on the sides treated with excimer monotherapy.

Kemény et al. [17], who first described the effectiveness of the excimer laser on psoriasis, postulates that the 308 nm wavelength of the laser light is more effective than 311 nm NB-UVB treatment in psoriasis. He also reports that in eight out of his 10 patients the length of remission induced by the 308 nm excimer laser is up to 2 years. Other data on remission rate is not yet available. In moderate psoriasis, 80–90% of the skin is not affected. The excimer laser treatment avoids unnecessary radiation exposure because the fiber optic, delivering monochromatic 308 nm UVB is close to the therapeutic optimum and selectively directed toward



lesional skin. This is particularly useful for the majority of patients with mild to moderate psoriasis.

## Conclusion

Our data confirm the fast clearance of psoriatic plaques reported in other studies [17,18].

The combination therapy with Calcipotriol allows an even faster onset of clearance in a way that psoriasis patients have not yet experienced.

The combination avoids the use of systemic therapy in many cases. Rapid improvement gives back hope and quality of life to the severely suffering chronic psoriasis patient.

The repetitive application of Calcipotriol after excimer laser treatment is likely to support the time of remission.

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## Zusammenfassung

### UVB-Phototherapie der Psoriasis mit dem 308 nm Excimer-Laser: Monotherapie versus Calcipotriol-Kombinationstherapie

**Hintergrund:** Ziel der vorgestellten Untersuchungen war es zu prüfen, ob eine Kombinationstherapie aus 308 nm Excimer-Laserbestrahlung und topischer Gabe von Calcipotriol effektiver in der Behandlung von Patienten mit stabiler Plaque-Typ-Psoriasis eingesetzt werden kann als eine Mono-Lasertherapie.

**Material and Methode:** In einer offenen Studie wurden 36 Patienten (21 Männer, 15 Frauen) mit stabiler Plaque-Typ-Psoriasis einer vergleichenden Kombi-/Monotherapie unterzogen. Die Patienten wurden 2x wöchentlich auf einer Körperseite (z.B. Rücken, Arm, Bein) mit einem 308 nm Excimer-Laser (XTRAC™, PhotoMedex, Radnor PA) mit einer UVB-Dosis von 200–1200 mJ/cm<sup>2</sup> und auf der anderen Körperseite zusätzlich mit Calcipotriol -Salbe (2x täglich, beginnend 0–7 Tage vor der Laserbestrahlung) behandelt. Zur Evaluation des Therapieerfolges wurde ein modifizierter PASI-Score (Psoriasis Area and Severity Index) bestimmt, der zu Beginn der Studie bei durchschnittlich 31 lag.

**Ergebnisse:** Der modifizierte PASI-Score belegte, dass bei Anwendung der kombinierten Behandlungsstrategie bereits nach 2 Laser-Therapiesitzungen eine Symptombesserung erreicht werden konnte. Diese betrug 40% auf der kombiniert behandelten Seite gegenüber 25% auf der anderen Seite, die nur bestrahlt und mit Vaseline versorgt wurde.

**Diskussion:** Es konnte gezeigt werden, dass die kombinierte UVB-Phototherapie mit begleitender Calcipotriol-Anwendung der Monotherapie in der Behandlung der Plaque-Typ-Psoriasis überlegen ist. Die 308 nm Excimer-Lasertherapie in Kombination resultiert in einer deutlich schnelleren Abheilung, die den Patienten eine ungewohnt rasche, gerade auch initiale Besserung ermöglicht.

**Schlüsselwörter:** Excimer-Laser; Calcipotriol; Psoriasis Plaques; UVB; Phototherapie

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