

# Comparative Clinical Experiences in the Treatment of Chronic Dermatoses using either a 308 nm Excimer Laser or a new monochromatic 308 nm Excimer System

Ulrich Amon<sup>1,2</sup>, Raul Yaguboglu<sup>1,2</sup>, Udo Schmidt<sup>3</sup>, Steffi Lederer<sup>2</sup>, Katrin Seßler<sup>2</sup>, Lisa Bröhl<sup>1</sup>, Michaela Gruber<sup>1</sup>

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## Key words

308 nm, excimer laser, monochromatic excimer phototherapy system, psoriasis, vitiligo

## Summary

The paper compares long standing of experiences with a 308 nm Excimer laser and a new monochromatic Excimer phototherapy system for treatment of different chronic skin diseases. Among different skin conditions chronic recalcitrant plaque psoriasis as well as localised vitiligo can be effectively treated. Both methods are comparable regarding photobiologic efficacy. However, differences in cost, handling, and payment allow a proper differentiation of both methods.

## Introduction

Based on a risk-benefit analysis, narrow-spectrum phototherapy with UVB 311 nm can today be considered an established procedure for the treatment of chronic inflammatory dermatosis [1, 2, 3]. Various technical developments have been derived from this, including 308-nm Excimer lasers. These lasers radiate 308-nm monochromatic light. This light is coherent, i.e. phase and amplitude of the lightwave are constant. The latest developments are Excimer systems. Because the light produced by these systems is non-coherent, i.e. the phase and amplitude are not constant, these systems cannot be defined as lasers. They do however have the medically relevant characteristic of the Excimer lasers: monochromatic radiation with the wavelength 308 nm [3-8]. According to the indications for narrow-spectrum phototherapy, these newer devices have been approved for the treatment of psoriasis vulgaris and vitiligo. Additionally, these treatment methods are effective for all applications that respond to 311-nm treatments, such as sensitive dermatosis, e.g. prurigo, lichenified eczema, initial mycosis fungoides and parapsoriasis en plaques. Furthermore, positive results have been achieved for oral lichen ruber, alopecia areata and laser induced hypopigmentation [sic!] [9-16].

Biologically, the effectiveness of the monochromatic light of Excimer lasers and Excimer systems – as far as known – results primarily from the apoptosis of lesional T-lymphocytes, whereas the necessary dose for this effect is lower than with conventional narrow-band UVB phototherapy [17, 18]. The substantial clinical advantages of 308-nm based systems compared to a complete or partial irradiation of the body with 311 nm are summarized in Table 1.

## Field Report: 308 nm Excimer Laser TALOS

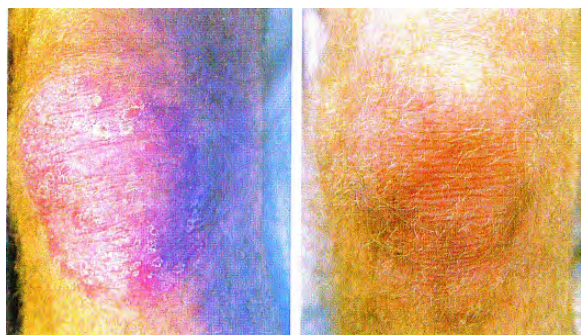
We have performed over 10,000 individual treatments with the Excimer laser TALOS [19-22] since 2001. More than 80 % of patients were treated for psoriasis vulgaris, 15 % patients were treated for vitiligo and approximately 5 % were treated for other dermatosis (chronic eczema, alopecia areata, acne papulopustulosa et al.). About 85 % of the individual treatments were performed in the clinic as a supplement to conventional photo therapy, for topical and/or systemic treatment for therapy-resistant psoriasis plaques. A recurring observation is that plaques that were treated with the Excimer laser, even with a possible stationary retreatment of acute exacerbated psoriasis, at the time of re-hospitalization were often considerably less distinctive or even still healed compared to the time before the laser treatment, even if this treatment was performed more than 6 months earlier.

The ambulatory treatment focus of the Excimer laser therapy differs substantially from the approach in the clinic. Primarily, psoriasis patients with plaques at predilected areas that do not respond adequately to conventional topical therapy are treated. The treatment option "laser instead of salve" shows the patients that a long-term alleviation of the symptoms can be achieved without application of salves (e.g. salicylic acid, vitamin D3-analogs, corticosteroids). The chance of a long-term period of over six months of freedom from the symptoms of psoriasis vulgaris is higher the sooner the use of topical medicaments is avoided. A substantial condition for long-term treatment success is therefore the targeted selection of patients for this procedure (Table 2).

<sup>1</sup> PsoriSol Klinik für Dermatologie und Allergologie, Hersbruck near Nuremberg

<sup>2</sup> Hautarztpraxis DermAllegra, Hohenstadt near Nuremberg

<sup>3</sup> Quantel Derma, Erlangen



*Fig. 1a: Treatment of an insulated plaque-psoriasis at right knee. 61 y., male. Existent for 30 years. Initial findings prior to 15 treatments with the 308-nm Excimer laser TALOS, once per week. Topical treatment with skin care product.*

*Fig. 1b: Output findings 4 years after therapy. No intermediate relapse.*



*Fig. 2a: Treatment example with the 308-nm Excimer phototherapy system for psoriasis. 61 y., male. Output findings after pretreatment with Clobetasol 17 propionate by external practice.*

*Fig. 2b: Findings after 3 treatment sessions (once per week), cumulative dose 3,600 J/cm<sup>2</sup>. Accompanying therapy: Skin care and Calcipotriol.*

For chronic plaque psoriasis, if these requirements are met, complete healing of the lesions can be achieved within 5 to 15 sessions in more than 90 % of the cases. No other method allowed us to achieve as many periods without symptoms among far more than 1,000 psoriasis patients per year as with the 308-nm Excimer laser (example: Fig. 1a and 1b). This long-term success can especially be achieved when the applied lesional dose exceeds clearly the individual MED [23].

For the treatment of vitiligo other initial conditions exist [4]. The necessity of the prognostical clarification of the patients is also indispensable to approximately estimate how likely a therapy is to succeed (Table 3). As an empirical rule of thumb: Isolated lesions on the torso or at the extremities close to the torso can be considerably better treated than the back of fingers, hands or feet. Patients have to be informed that in case of good prognosis, 20 to 30 treatments have to be expected until a stable pigmentation can be achieved.

Despite standardized and constant treatment, it is possible that long-term macular inhomogeneous pigmentations can appear. A large-area vitiligo that has been present for many years without any spontaneous pigmentation tendency does

not represent an indication for a targeted therapy with 308-nm based techniques. While a multiplication of the MED of the treated lesions is a significant part of the therapy success of the plaque psoriasis – depending upon the situation and localization – the treatment doses for vitiligo are increased in small steps (and sometimes not at all).

#### Field report: monochrome 308-nm Excimer-Phototherapy System

Based on our extensive experiences with the Excimer laser, we were able to analyze the clinical effectiveness and application of a new incoherent monochromatic 308 nm Excimer phototherapy system within a test phase of three months. Different cases are shown in figures 2 to 6. Although the observation phase is comparatively short, it can be stated that the clinical efficiency, i.e. the temporal response to the treatment regarding the number of held sessions, is absolutely equivalent to the Excimer laser. The compactness of the device enables a mobile handling and allows medical assistants to learn how to use it very quickly. Although the energy (mW/cm<sup>2</sup>) of the new system is five times less than the energy of the Excimer laser, the treatment speed is within a few sessions comparable to the laser due to the bigger application area (spot size).

**Table 1: Advantages of a targeted 308 nm-based therapy vs. a 311 nm-total or partial body irradiation**

Very individual treatment in regards to chronicity, pretreatment, localization, sensitivity (MED)

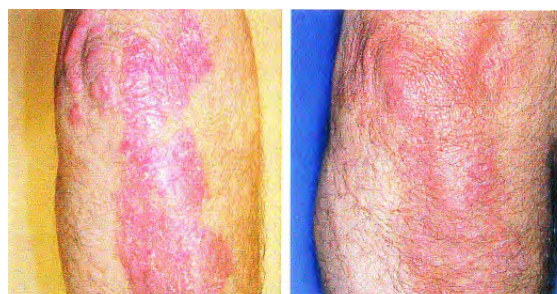
Targeted, localized therapy: each lesion can be treated differently, the healthy skin is protected

Very fast response: by focusing on the lesional skin, a higher dose can be used or the dose can be quickly increased

Short treatment duration: depending on the required energy from a few seconds to a few minutes

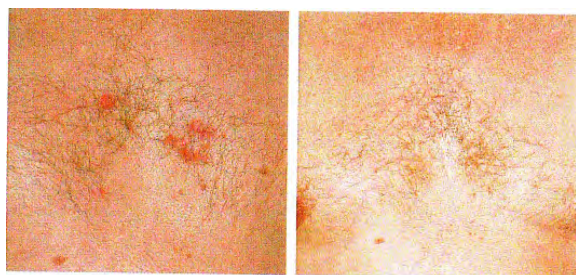
Good possible combinations: synergy effects by topical and/or systemic therapy according to the stage of the therapy.

Time-consuming external therapy can be omitted: often pure skin care is sufficient with psoriasis after 2 – 4 treatment sessions



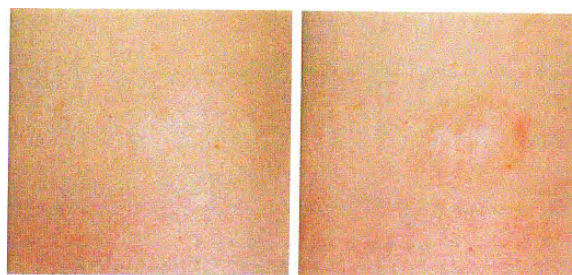
*Fig. 3a: Treatment example with the 308-nm Excimer phototherapy system for psoriasis. 55 y., male. Initial findings after pretreatment with skin care and washable ointment containing 3 % salicylic-acid.*

*Fig. 3b: Findings after 11 treatment sessions (once per week), cumulative dose 11,750 J/cm<sup>2</sup>. Accompanying therapy: Skin care and Calcipotriol.*



*Fig. 4a: Treatment example with 308-nm Excimer phototherapy system for psoriasis. 46 y., male. Output findings after pretreatment with topical Corticosteroids class III and Calcipotriol by external practice.*

*Fig. 4b: Findings after 5 treatment sessions (once per week), cumulative dose 2,400 J/cm<sup>2</sup>. Accompanying therapy: Skin care.*



*Fig. 5a: Treatment example with 308 nm Excimer phototherapy system for vitiligo. 45y., female. No pretreatment.*

*Fig. 5b: Findings after 15 treatment sessions (once per week), cumulative dose 2,830 J/cm<sup>2</sup>. Accompanying therapy: Vitrix®.*

Nevertheless, the same selection criteria are here valid (Tables 2 and 3).

The substantial technical difference to the Excimer laser is that the active medium, XeCl gas, is hermetically encapsulated in glass tubes, which eliminates gas consumption. The optics in the laser head cannot be contaminated as the electrodes are outside of the gas. Thus, high costs for consumables are eliminated (gas exchange, replacement of the laser head). Further differences are summarized in Tables 4 and 5.

**Table 2: Selection criteria for increasing the therapy success with chronic plaque psoriasis at the beginning of an ambulatory 308 nm-based treatment**

- Chronic plaques without clear local thrust tendency
- Affected predilection areas with prioritization regarding the response to the treatment:  
Elbow = knee > lumbo sacral region > front hair border
- Exclusion of a parallel existing psoriasis guttata
- Exclusion of a possible bacterial focus
- No pretreatment with topical corticosteroids in the past 8 weeks
- No pretreatment with system therapeutics within the past 3 months

**Table 3: Variables that can affect the success of vitiligo based on an ambulant 308-nm based therapy**

- Existence duration
- Degree of spreading
- Temporal dynamics of the depigmentation and spontaneous repigmentation
- Genetic diathesis for vitiligo
- Comorbidities with other autoimmune illnesses
- Responsiveness to 311-nm UVB phototherapy
- Respond to topical treatments (e.g. immune modulators)

## Discussion

Besides conventional narrow-band UVB phototherapy, treatments of lesional skin with an emission spectrum of 308 nm can be considered established procedures. The 308-nm Excimer laser therapy has been included in the German S3 guideline for the therapy of psoriasis vulgaris [24]. Based on our long-term experience, there is no equivalent procedure in regards to the quickness of the healing process and the period of non-recidivism of the treated areas. For example, many patients report a complete remission of psoriasis at the treated areas for periods of at least 6 months, sometimes also for more than a year [25, 26].

The correct patient selection, the therapy plan and the accurate dose identification play a decisive role in the treatment success [23, 27]. Although there are no long-term experiences concerning the new incoherent 308 nm phototherapy system, photobiologically we can consider the device in principle the equivalent of the Excimer laser regarding the treatment efficiency.

## Contact Address

Professor Dr. med. Ulrich Amon  
Medical Director  
PsoriSol Klinik für Dermatologie und Allergologie  
Mühlstraße 31  
D-91217 Hersbruck  
amon@psorisol.de



*Fig. 6a: Treatment example with 308-nm Excimer phototherapy system for vitiligo. 41 y, female. Pretreatment with UVB 311 nm complete body phototherapy.*

*Fig. 6b: Results after 6 sessions (once per week), cumulative dose 2,850J/cm<sup>2</sup>. Accompanying therapy: Vitix®*

Table 4: Comparative data between a 308-nm Excimer laser and the new incoherent 308-nm Excimer phototherapy system

	XeCI Excimer Laser TALOS	XeCI Excimer System
Wavelength	308 nm	308 nm
Results	+++	+++
Energy	250 mW/cm <sup>2</sup>	50 mW/cm <sup>2</sup>
Spot size	4.9 cm <sup>2</sup>	up to 16 cm <sup>2</sup>
Optical energy	1000 mW	800 mW
Weight	100 kg	1.5 kg
Consumables	gas (€)	—
Price	€€€€€	€

Table 5: Subjective user comparison of advantages (pro) and disadvantages (con) of the 308-nm Excimer laser and the new incoherent 308-nm Excimer phototherapy system

	XeCI Excimer Laser TALOS	XeCI Excimer System
Mobility <sup>1</sup>	Con	Pro
Long-term costs <sup>2</sup>	Con	Pro
Acquisition costs	Con	Pro
Protection of the surrounding tissue <sup>3</sup>	Pro	Pro
Usability <sup>4</sup>	Pro (con)	Pro
Settling private health insurance (PKV) <sup>5</sup>	Pro	Con
Settling public health insurance (IGel) <sup>6</sup>	Con	Pro

1 Related to possible use in different practice rooms or if necessary as common acquisition of several practices on different locations.

2 Related to potential costs of maintenance, consumption or backfitting.

3 Related to therapeutical focus of lesional skin and protection of the non-affected healthy perilesional skin.

4 Related to the proper technical treatment. In principle the articulated mirror arm of the laser and the optical head of the Excimer phototherapy system allow a fast implementation from lesion to lesion. Concerning many affected areas, the use of the new system is more practical compared to the articulated mirror arm.

5 Concerning the Excimer laser the GOÄ laser figures 2440/2885/2886 are valid. Most of the private health insurances cover the costs – after presenting a detailed medical certificate including an estimation of costs – for a mostly limited number of sessions. On the other hand, the Excimer phototherapy system can be settled per definition to the GOÄ phototherapy figure 567 (if necessary with a factor of 2.5 due to higher effort regarding time and equipment).

6 After widespread experiences as well as feedback from many users within the last years, billing according to the of the GOÄ figure 2440 is widely used; in our opinion, this does not adequately represent economically the use of the laser. If this sum is used as a basis and GOÄ figure 567 is applied with a higher inflation rate, the treatment with the new procedure at approximately € 50 (IGel) per session is in our opinion well represented in terms of time and costs.

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