

## Case Report

# Treatment of Alopecia Areata With the 308-nm Xenon Chloride Excimer Laser: Case Report of Two Successful Treatments With the Excimer Laser

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**Background and Objectives:** Alopecia areata is a common disease of unknown etiology; it causes significant cosmetic and psycho-social distress for most of the people it affects. We report on an innovative form of treatment in two patients with typical alopecia areata on the capillitium.

**Study Design/Patients and Methods:** We successfully treated two patients whose alopecia areata had worsened progressively for 3 and 14 weeks. The treatment involved the use of a 308 nm xenon chloride excimer laser (dosage 300–2,300 mJ/cm<sup>2</sup> per session).

**Results:** After 11 and 12 sessions within a 9-week and 11-week period, the entire affected focus showed homogenous and thick regrowth. No relapse was observed during the follow-up period of 5 and 18 months.

**Conclusions:** The use of the excimer laser is an effective, elegant, and safe means of treatment and has good tolerability. Analogous to topical treatment of alopecia areata, the immunosuppressive mechanism of the excimer laser can be interpreted as an induction of T-cell apoptosis. This new means of treatment has yet to be discussed in medical literature. Further studies with greater numbers are needed to assess its potential more precisely and evaluate the excimer laser in treating alopecia areata. *Lasers Surg. Med.* 34:86–90, 2004. © 2004 Wiley-Liss, Inc.

**Key words:** alopecia; laser; regrowth; treatment

## INTRODUCTION

Alopecia areata is the most common form of hair loss after androgenetic alopecia. The loss of hair usually occurs without subjective complaints. However, more severe forms of the disease can lead to marked psycho-social problems. The pathogenesis of alopecia areata is unknown to date. Numerous studies of its etiology have been conducted from different perspectives of specialized branches of medicine. Hypotheses have been made about influences that range from psychosomatics, environmental effects such as toxins and infections, and genetic factors to autoimmune diseases and immunology [1,2]. In general, the use of effective medicines is complicated by the fact that not all of the options have a tolerable scope of adverse

effects. The results of new research, however, make it possible to recognize aspects of the pathogenesis of this disorder and indicate that it can likely be classified among autoimmune diseases [3–5]. In spite of the side effects which can be quite a nuisance, several studies have shown that topical immunotherapy is the most effective treatment to date [1,3–5]. In our case study, we used a xenon chloride (XeCl) excimer laser to create an immune response in a focus affected by alopecia areata. The XeCl excimer laser is an efficient and promising therapeutic option in current treatment of therapy-resistant and chronic forms of psoriasis vulgaris [6–8]. In one case report, there was also evidence of successful treatment of psoriasis inversa with the excimer laser [9]. New data suggest that the XeCl excimer laser might also become the dermatologist's treatment of choice for vitiligo [10]. Our case report is the first discussion of treating alopecia areata with the XeCl excimer laser.

## CASE REPORT

### Case 1

A 31-year-old male patient presented with spontaneous and progressively worsening hair loss which had been developing for 14 weeks. On physical examination there was a solitary left parietal oval hairless patch measuring 2.7 × 3.5 cm (Fig. 1). The clinical examination showed no evidence of disease; routine laboratory parameters including syphilis serology and thyroid tests were normal. The trichogram showed the typical clinical picture for alopecia areata in the margins of the focus. Eleven weeks of treatment with topical tacrolimus (0.1%) yielded no success. After that, treatment with the XeCl excimer laser was pursued 15 weeks after the first manifestation of alopecia areata.

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Fig. 1. Patchy alopecia areata at the left parietal capillitium after 14 weeks. Image is taken before beginning treatment with excimer laser. [Figure can be viewed in color online via [www.interscience.wiley.com](http://www.interscience.wiley.com).]

## Case 2

A 48-year-old female patient presented with spontaneous and progressively worsening hair loss which had been developing for 3 weeks. On physical examination, a solitary right parietal patch of alopecia was found that measured  $2.1 \times 2.5$  cm. Only the roots of the hair follicles remained in this area. The clinical examination showed no evidence of disease; the routine laboratory parameters including syphilis serology and thyroid tests were also normal. The trichogram showed the typical clinical picture for alopecia areata in the margins of the focus as well. Treatment with the XeCl excimer laser was pursued 3 weeks after the first manifestation of alopecia areata. The patient had not undergone any previous therapy.

## COURSE OF THERAPY

The affected foci were treated in regular intervals (up to twice a week) with increasing dosages using the 308 nm XeCl excimer laser (60 nanosecond pulse duration, fluence  $2 \text{ mJ/cm}^2$ , Device of Tuilaser, Germany). The laser was set to an impulse frequency of 200 Hz. The square diameter of

**TABLE 1. Detailed Data of the 12 Treatments With the XeCl Excimer Laser (Male Patient)**

Session number	Time (day)	Dosage ( $\text{mJ/cm}^2$ )	Clinic/figures
01	0	300	Figure 1
02	4	400	—
03	7	400	—
04	11	400	—
05	14	500	No side effects to date
06	18	500	Slight erythema, minor crusting after vesicles
07	21	500	Slight erythema
08	28	600	New hair has grown back Fig. 2
09	32	650	Increase of hair growth
10	39	700	Increase of hair growth
11	42	700	Increase of hair growth
12	62	700	Almost all of the hair has returned, end of therapy Fig. 3

the light spot was 1.41 cm. When mild erythema appeared, the irradiation dose was held constant for the subsequent treatment or until the resolution of the symptoms. Tables 1 and 2 show the data on the number of sessions, intervals between sessions, dosages, and clinical observations.

## RESULTS

Treating the male patient (skin type II) resulted in no adverse effects until the fifth session; the focus was, however, slightly erythematous for 12–36 hours after the fifth treatment. From the sixth treatment session onward (at higher dosages), vesicles and slight crusting were observed for 2–3 days. The patient did not indicate any post-treatment pain. After eight sessions some initial hair growth was observed (Fig. 2). After 12 sessions (62 days),

**TABLE 2. Detailed Data of the 11 Treatments With the XeCl Excimer Laser (Female Patient)**

Session number	Time (day)	Dosage ( $\text{mJ/cm}^2$ )	Clinic
01	0	600	—
02	4	900	—
03	7	950	Slight erythema
04	13	1,300	Slight erythema
05	18	1,700	Slight erythema
06	21	1,800	Medium erythema
07	35	1,800	Slight erythema
08	43	1,800	New hair has grown back
09	52	1,900	Increase of hair growth
10	62	2,100	Increase of hair growth
11	75	2,300	Increase of hair growth
12	96	—	Almost all of the hair has returned, end of therapy



Fig. 2. Discrete erythema and initial inhomogeneous hair growth after seven treatments with excimer laser (day 28). [Figure can be viewed in color online via [www.interscience.wiley.com](http://www.interscience.wiley.com).]



Fig. 3. Homogeneous hair growth after 11 treatments with excimer laser (day 62). [Figure can be viewed in color online via [www.interscience.wiley.com](http://www.interscience.wiley.com).]

thick and homogeneous hair growth was present in the entire treated area (Fig. 3). The treated area did not require any special care. In the 18-month follow-up period there was no evidence of relapse.

In treating the female patient, we used higher initial dosages due to her skin type III. After the second treatment session, the focus was slightly erythematous for 12–36 hours. From the eighth treatment onward, initial hair growth was observed again. After 11 sessions (96 days), thick and homogeneous hair growth was present in the entire treated area. The follow-up period was 5 months; there was no evidence of recurrent hair loss.

## DISCUSSION

To date, topical immunotherapy in clinically controlled studies has been shown to be the most effective method of available treatment [11,12]. Topical immunotherapy involves intermittently inducing allergic contact dermatitis on the scalp [12,13]. Two studies examined the efficacy and tolerability of diphenylcyclopropenone in the treat-

ment of severe alopecia areata. In one study total regrowth of terminal hair was achieved in 48% of 52 patients after 6 months. Persistent response was observed in 60% after 6–18 months of follow-up (mean: 12 months) [14]. The other study evaluated 68 patients. With an overall response rate of 70.6%; complete remission was obtained in 30.9% and partial remission in 39.7%. The treatment of severe alopecia areata frequently shows side effects and a relatively high relapse rate [15]. In treating alopecia areata, the desired side effects of topical immunotherapy are erythema, mild pruritus with desquamation, and the swelling of retroauricular lymph nodes. Undesired adverse effects include bullous allergic contact dermatitis, changes in pigmentation, contact urticaria, and contact allergy to acetone when diphenylcyclopropenone is used in acetone.

In our case report, an attempt was made to use the excimer laser to create an immune response in the affected foci, analogous to topical immunotherapy or steroids. The excimer laser emits light at a wavelength of 308 nm. The effects of the excimer laser's light on the treated skin induces the desired UV erythema. Side effects of excimer

laser treatment depend on the intensity and skin type. In our cases, the absolute dosage was higher for the female patient than for the male (600–2,300 vs. 300–700 mJ/cm<sup>2</sup>) because of the different skin types (type III vs. II).

As in the case with the other therapeutic strategies mentioned, the exact mechanism of action is not known. As with psoriasis treatment, an increased induction of T-cell apoptosis plays a central role in both PUVA therapy and in the effects of the excimer laser [16,17]. Based on this, it can be postulated that in the case of alopecia areata, the immunosuppressive mechanism is likely to result from an interruption of the autoaggressive immune cascade that results from excimer-laser-induced T-cell apoptosis. A change in interleukin production may be the reason why topical immunotherapy for alopecia areata is effective [18]. A study by Tosti et al. shows that clobetasol propionate 0.05% is effective in inducing hair regrowth in patients with alopecia totalis or universalis due to the local immune modulating effect of the drug [19].

Given the chronology of the regrowth in both cases, the successful treatment of our patients shows a direct correlation to the use of the XeCl excimer laser. All of the therapeutic strategies for treating alopecia areata discussed in the literature are confronted with the question as to whether spontaneous remission is possible. The rate of spontaneous remission in patients with extensive alopecia areata (more than 40% hair loss) appears to be lower than for those with less than 40% involvement (patchy alopecia areata). In 24% of patients with extensive alopecia areata, complete or nearly complete regrowth was observed in the follow-up period of 3–3.5 years [20]. The course of the disease and the prognosis of alopecia areata is usually quite variable and depends on the extent of the hair loss. No general statements can be made about individual cases, which are unpredictable.

Patchy alopecia areata is usually self-limited, and regrowth can be expected within a year in the majority of patients, with or without treatment [21]. One study showed no benefit of treatment (minoxidil 1% and topical immunotherapy) over placebo in patients with less than 40% involvement [22]. When untreated, the first episode lasts less than 6 months among one-third of the patients and less than 1 year among half; in 20–30% there is no resolution, even after years have passed. Recurrences are observed in 40–50% at intervals ranging from a few weeks to up to 5 years after the first episode. Only one-third of all patients remain completely free of recurrence [21–23]. The treatment as described above is a marked improvement for patients because of the simplified ease of administration and the rapid evidence of improvement. Furthermore, the ability to aim the laser precisely and locally is practical in terms of reducing any undesired side effects. The treatment was painless; depending on the length of the impulses selected, only a mild feeling of warmth was reported.

The question as to the reliability of regrowth after treatment with the excimer laser can only be answered when greater numbers of controlled case studies and clinically significant success rates have been presented. Splitting a

lesion into treated and untreated halves could provide valuable information about the efficacy of this treatment. In the future, critical evaluations must be performed with regard to the optimal length of treatment, dosage, and the corresponding effects on clinical improvement in regrowth. For this reason, the next important step must be to conduct larger studies to assess this new therapeutic option and its outcome on a disease that is widespread and usually difficult to treat.

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