

## The Hair Root Pattern after Calcipotriol Treatment for Scalp Psoriasis

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Scalp psoriasis is associated with hair loss and an increased telogen/anagen ratio. Topical treatment of scalp psoriasis (with corticosteroids, dithranol or tar) results in decreased scaling, induration and erythema of the plaques. Calcipotriol is effective in the treatment of psoriasis vulgaris. However, the potent growth-inhibiting potential of this compound might theoretically induce hair loss. A study was designed to find out to what extent calcipotriol treatment modulates the percentage of anagen and telogen hair during treatment of scalp psoriasis.

A group of 26 patients participated in a placebo-controlled dose-finding study on the efficacy of calcipotriol in scalp psoriasis. Hair plucks before and after treatment were taken. The telogen/anagen ratio remained unaffected during 6 weeks of calcipotriol treatment. No correlation was demonstrated between efficacy of treatment and quantification of telogen/anagen ratio. It can be concluded that the growth-inhibiting potential of calcipotriol is not reflected in the *in vivo* hair growth pattern during calcipotriol treatment. **Key words:** alopecia; hair-loss.

(Accepted March 27, 1995.)

Acta Derm Venereol (Stockh) 1995; 75: 388-390.

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It is well known that extensive hair loss may occur in patients with erythrodermic and pustular forms of psoriasis (1). But also in chronic plaque psoriasis hair loss has been reported. Shuster observed less dense hair in psoriatic plaques of the body and scalp (2). Scalp psoriasis combined with scarring alopecia has occasionally been reported (2-4). Matsunaga & Maibach reported mild to severe hair loss and a telogen effluvium (1). Recently, we have demonstrated that hair plucks taken from

psoriatic plaques on the scalp show an increase in the percentage of telogen hair compared to normal controls (5).

Various antipsoriatic treatments are effective in the treatment of scalp psoriasis such as corticosteroids, tar and dithranol. The influence of these treatments on hair growth has been studied by Runne & Kroneisen-Wiersma (6). They reported a complete hair regrowth in most cases after topical treatment with salicylic acid, dithranol, colourless tar extracts and corticosteroids. Calcipotriol is a relatively new and effective treatment for psoriasis vulgaris (7). Recently a calcipotriol gel for treatment of scalp psoriasis has been developed. Calcipotriol is both a potent regulator of cell differentiation and an inhibitor of cell proliferation (8). So far, it cannot be excluded that calcipotriol penetrates the subcutis to the extent that growth and differentiation of hair bulb cells are modulated. Therefore, in view of its potent growth-inhibiting potential, hair loss is a possible side-effect. So far, hair growth during calcipotriol treatment has not been studied.

The aim of the present study was to find out whether calcipotriol might impair hair growth. We designed a placebo-controlled dose-finding study with calcipotriol gel to investigate whether calcipotriol treatment results in a modulation of the telogen/anagen ratio.

### MATERIAL AND METHODS

Twenty-six patients (14 males and 12 females, mean age 46 years, range 21-66 years) with chronic plaque psoriasis lesions on the scalp and psoriatic lesions on the body participated in a double-blind parallel group investigation. This study was part of a multicentre trial on the efficacy and side-effects of calcipotriol gel in scalp psoriasis. After a wash-out period of 2 weeks, the lesions on the scalp were treated during 6 weeks. Treatment consisted of calcipotriol gel of 3 different strengths (10, 25 and 50 µg/g) or the vehicle. Seven patients were treated with vehicle, 8 with 10 µg/g, 5 with 25 µg/g and 6 patients with 50 µg/g calcipotriol gel.

Before treatment as well as 6 weeks later, the severity of scalp psoriasis was assessed following a 5-point scale for erythema, induration and desquamation (1 = absent, 2 = slight, 3 = moderate, 4 = severe, 5 = severest possible). A total severity score was calculated by summing up the scores. The efficacy of treatment was recorded by comparing the initial clinical situation with the clinical situation after 6 weeks of treatment. A 6-point scale was used (1 = condition unchanged, 2 = slight improvement, 3 = moderate improvement, 4 = marked improvement, 5 = clearance).

Hair plucking was performed before and after 6 weeks of treatment from the same psoriatic plaque. At least 2 days before the initiation of the investigation, washing of the scalp hair was not allowed. The method of hair plucking was as described by van Scott et al. (9). Hairs were embedded in Permunt medium. The numbers of anagen and telogen hairs were assessed by light microscopical investigation.

In order to exclude the influence of age, sex and other interindividual variables, statistical analysis was carried out using a paired *t*-test.

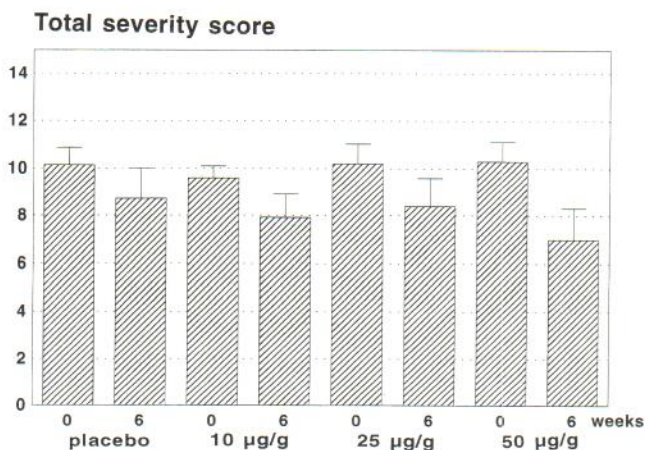


Fig. 1. Total severity score as rated for erythema, induration and desquamation before treatment (0 weeks) and after treatment (6 weeks) with placebo and calcipotriol at various concentrations (mean  $\pm$  SEM).

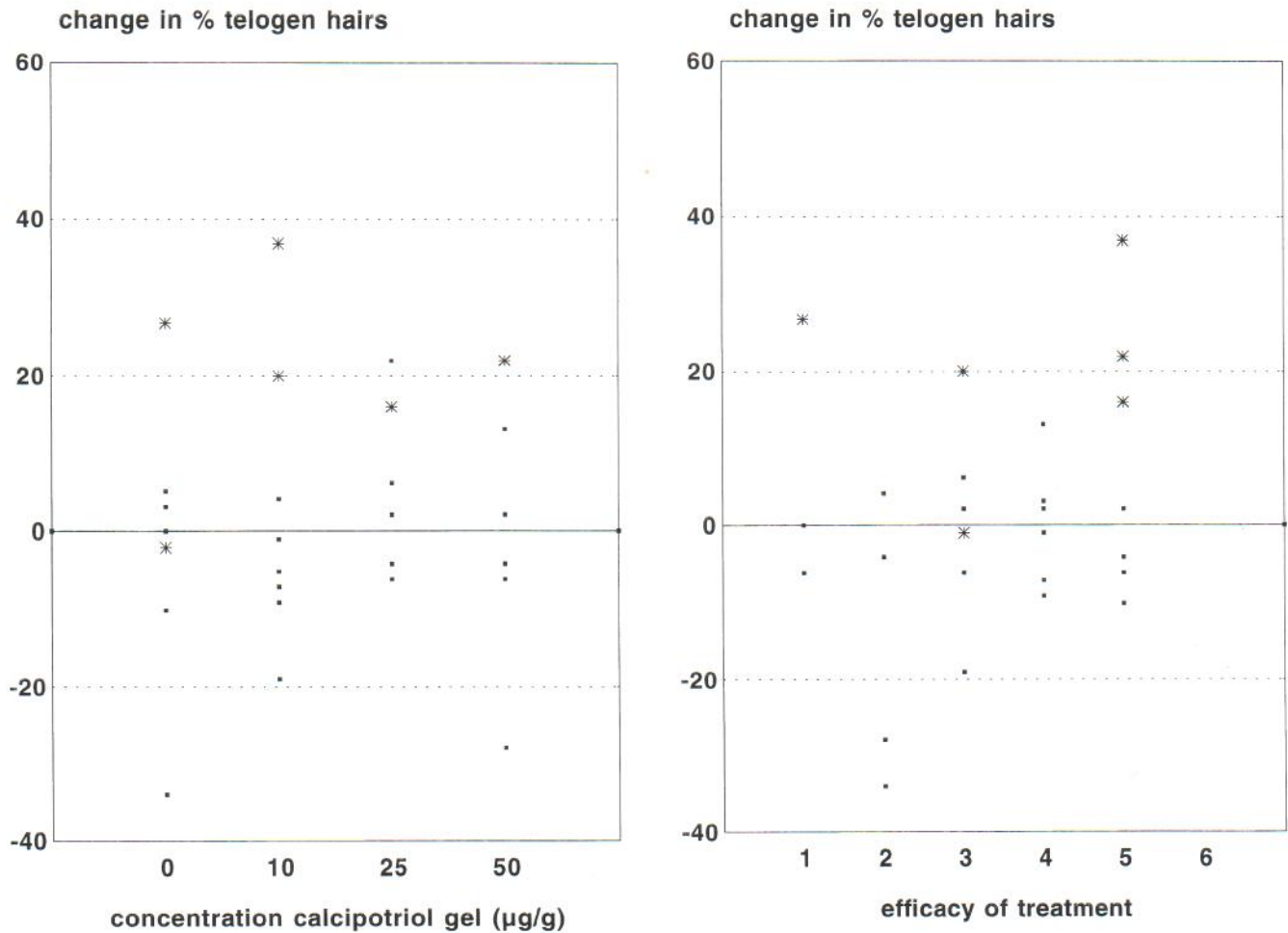


Fig. 2. Correlation between the change in telogen counts (= % telogens before minus % telogens after treatment) and: (a) treatment with placebo or calcipotriol at various concentrations; (b) efficacy of treatment. Patients with an increased telogen count before treatment are marked as \*.

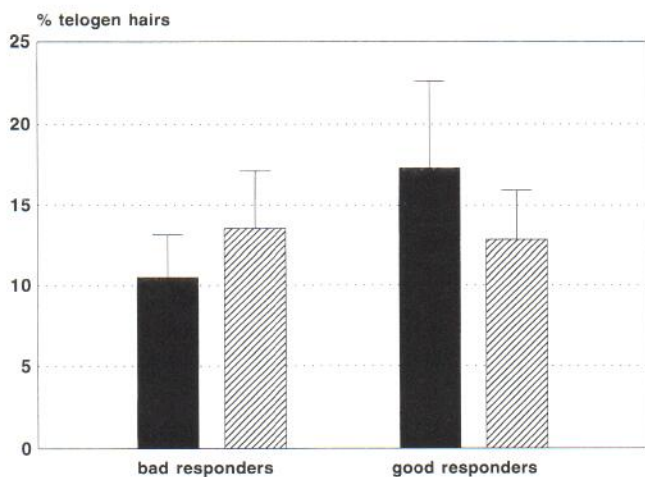


Fig. 3. Mean % of telogen hairs before treatment (black bars) and after treatment (shaded bars) in patients with a bad clinical response and patients with a good clinical response to treatment (mean  $\pm$  SEM).

RESULTS

*Clinical response*

Fig. 1 illustrates the clinical responses to placebo and calcipotriol at various concentrations. In the patients treated with calcipotriol gel of 50  $\mu\text{g/g}$ , a statistically significant decrease in severity score was achieved ( $p < 0.05$ ). In the other patients, treated with placebo, calcipotriol gel 10 and 25  $\mu\text{g/g}$ , no significant decrease of the severity score could be shown.

*Influence of calcipotriol treatment on telogen/anagen ratio*

The relation between the treatment with placebo or calcipotriol and the change in telogen count (= % telogens before minus % telogens after treatment) is shown in Fig. 2a. A positive value of this difference means that treatment has had a beneficial effect on the hair growth pattern, i.e. a decrease of telogens. In contrast, when the difference is negative, treatment has led to an increased amount of telogens.

In 6 patients, marked in Fig. 2 with an asterisk, the percentage of telogen hairs was increased (> 20%) before treatment was started. Five patients showed an improvement after treatment, (1 patient treated with placebo and 4 treated with calcipotriol gel of different strengths).

It is clear that the influences of placebo and verum on the hair root pattern were equal. No significant increase of telogens after treatment with high-dose calcipotriol gel (25 µg/g and 50 µg/g), compared with placebo or low-dose calcipotriol gel (10 µg/g), was detectable.

#### *Correlation between telogen counts and efficacy*

The relation between the efficacy of treatment and the change in telogen counts is shown in Fig. 2b. No relation could be established between the efficacy of treatment and the change in telogen hairs.

For bad responders (efficacy graded as 1, 2 or 3) and good responders (efficacy graded as 4, 5 or 6) the mean percentage of telogens before and after treatment is shown in Fig. 3. No statistically significant differences in telogen counts before and after treatment were present in the groups of bad responders and good responders.

#### DISCUSSION

The present study seems to confirm earlier reports, concerning the association of plaque psoriasis of the scalp and a telogen effluvium. In 6 patients (= 23%) the percentage of telogen hairs was increased (> 20%) before therapy was started.

The present study demonstrates that a moderate to marked clinical improvement of scalp psoriasis had been reached in 13 out of 26 patients following calcipotriol treatment. However, clinical improvement did not always result in a decrease of the proportion of hairs in the telogen phase. It is possible that the telogen fraction improves as a late result. Indeed, regrowth of hair is observed 2–4 weeks after improvement or clearing of the scalp psoriasis (8). A period of 6 weeks between the hair plucking appears to be too short to detect changes in the hair growth pattern.

Only in 2 patients was an increase of the percentage of telogen hair with > 20% present after treatment (Fig. 2). No tendency at various concentrations was observed to a reduction

of the percentage of anagen hair or an increase of the telogen count. The discrepancy between the substantial antiproliferative effect of calcipotriol treatment on the interfollicular epidermis and the absence of an antiproliferative effect on the hair bulbs is intriguing. An explanation for this discrepancy might be the fast conversion of calcipotriol into inactive compounds, yielding concentrations too low at the hair bulbs for an effect on hair growth. It is of practical relevance that calcipotriol appears not to have the potential to reduce hair growth.

#### ACKNOWLEDGEMENTS

This study was part of a multicentre study on the efficacy and side-effects of calcipotriol gel in scalp psoriasis carried out by LEO Pharmaceutical Products. We wish to acknowledge C. W. Hol for helpful discussion.

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