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Alfatradiol (0.025%) ± An effective and safe therapy option for the treatment of androgenetic Alopecia in women and men

Alfatradiol (0.025%) ± an Effective and Safe Therapy for the Treatment of Androgenetic Alopecia in Women and Men

Summary

Constitutional hair loss, also known as androgenetic alopecia (AGA) or alopecia androgenetica, is the most common cause of hair loss in adults in both sexes. One option in the treatment of AGA in men and women is alfatradiol, a topically effective eststeride without hormonal effects , about the inhibition of the 5tha−reductase has a direct causal effect on the pathomechanism of hair loss. In a multicentre, open study with 233 patients (192 women, age 14 ± 76 years; 41 men, age 17 ± 56 years), trichograms of 112 patients (92 women, 20 Men) are evaluated. During therapy with alfatradiol, the frontal anagen hair rate increased statistically significantly compared to the initial value, in women from 69% to 77% (mean values) and in men from 56% to 65%. The proportion of telogen hair decreased accordingly. In 12% of women and 21% of men, the hair rate continued to decrease during treatment. Only three patients (1.3%) reported slight local intolerance reactions.

Abstract

Androgenetic alopecia (AGA), also referred to as male pattern baldness, is the most common cause of hair loss in both sexes in adulthood. An option for topical treatment that selectively tar− gets the metabolic pathways involved in the balding process is alfatradiol, an estrasterid without hormonal activity. In a drug monitoring study, efficacy and safety of alfatradiol (0.025%) was assessed in 233 patients with AGA (192 women, aged 14 ± 76 years, and 41 men, aged 17 ± 56 years). After 7.5 months of treatment, trichograms of 112 patients (92 women, 20 men) were evaluated. Under treatment with alfatradiol the proportion of frontal anagen hair increased statistically significantly, in wom− en from 69% to 77% (means) and in men from 56% to 65%. The proportion of telogen hair decreased accordingly. In 12% of women and 21% of men a further decline in the number of anagen hair was observed. Merely three patients (1.3%) reported mild local adverse reactions. In conclusion, Alfatradiol appears to be effective and safe in the topical treatment of AGA in both men and women.

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introduction

Constitutional hair loss, also known as androgenetic alopecia (AGA) or alopecia androgenetica, is the most common cause of hair loss in adults in both sexes. In Germany, it is estimated that two thirds of all men and one third of all women are affected [1 ± 6]. The incidence of AGA in Asian and African men appears to be lower than in men of European descent [7–9]. AGA generally begins in early adulthood, but can also occur in puberty. Depending on the age at which it is manifested, mostly younger men around 20 ± 30 years and women around 40 ± 50 years of age seek advice from a doctor, women at least Present just as often as men [3].

AGA has been classified as an independent disease by the World Health Organization (WHO). A defining reason for this are the psychosocial consequences of the AGA for the men and women affected. The sociocultural, religious and psychological significance of scalp hair has been described in many literary and scientific terms. Reduced life satisfaction, low self-esteem, a negative body image, social anxiety and shame are more found in women, but also in men, with the severity of the consequences being greater in women than in men [10 ± 16].

The clinical picture of AGA is different in women and men. Grouped by gender, a Hamilton-Norwood or masculine type (male pattern) and a Ludwig or feminine type (female pattern) of AGA are distinguished. Combination images (mixed patterns) are not uncommon. In most cases (> 80%), the receding of male scalp hair begins with the formation of recessed hairline corners in the frontal head area and later continues with the formation of a tonsure in the occipital head area. In later stages, these two areas unite and baldness occurs. In women, the AGA only affects the vertex region, the hair inventory is increasingly reduced and bald spots develop [17 ± 18].

The pathogenesis of AGA has not yet been fully elucidated. The development of AGA is determined by the interplay of genetic disposition and hormonal manifestation factors. AGA can thus be described as a genetically determined, dihydrotestosterone (DHT) -dependent process with continuous miniaturization of the sensitive hair follicles [3]. Most studies have focused on the effect of androgens or their peripheral metabolites on the hair follicle.

Androgen synthesis, which consists of a series of biochemical catalytic reactions, begins with the conversion of cholesterol into 17-keto steroids, a group of relatively weak androgens. This group includes, for example, dehydroepiandrosterone (DHEA), which has a low affinity for the androgen receptor [19 ± 23]. These weak androgens are in turn activated by other enzyme systems, such as 3b−Hydroxysteroid dehydrogenase (3beta− HSD), converted into more effective androgens such as testosterone converts [19 ± 23]. The testosterone is finally produced by the enzyme 5a−reductase is metabolized to the more potent androgen DHT [24 ± 27]. Compared to testosterone, DHT has an affinity for the androgen receptor that is approximately 5 times higher [28]. Testosterone and DHT are either converted to weak androgens by enzymatic conversion or to 17 by aromataseb−Estradiol is metabolized [19 ± 23, 25, 26]. The androgens only develop their cellular effect when they bind to an intracellular androgen receptor. Investigations have shown that the androgen receptor level, which is decisive for the cellular effects of androgens, is 1.5 times higher in the frontal head area than in the occipital area [29, 30]. Also increased 5a−Reductase activities and thus increased DHT concentrations in the frontal head area of the affected men compared to the occipital area [31].

Compared to men, affected women have lower androgen receptor levels, lower levels of the 5th gradea−Reductase and higher levels of aromatase in the scalp [31, 32]. The use of aromatosis inhibitors in women leads to the progression of androgenetic alopecia [31, 32].

Of the enzyme 5, which is crucial for AGAa-Reductase, two isoforms are known [33,34], which could be detected in different amounts in the hair follicle of both men and women [19, 28 ± 31].

The pharmacological active ingredient alfatradiol is a synthetic stereoisomer of the physiological female sex hormone 17b- estradiol. According to the INN (International Nonproprietary Names for Pharmaceutical Substances) nomenclature, the chemical name of the molecule becomes ¹Estra − 1,3,5 (10) −trien − 3.17a−diol "(17a -Estradiol) is called alfatradiol. In contrast to 17b-Estradiol, alfatradiol does not enter into any clinically relevant interactions with the estrogen receptor [35,36], that is, the drug has no hormonal effects in therapeutic doses. For better differentiation from the hormonally effective 17b-Estradiol, the name alfatradiol should be used throughout. The aim of topical therapy with alfatradiol is to intervene specifically in the biochemical processes at the hair root. It is believed that alfatradiol has both isoforms of the 5tha−Reductase inhibits [37] and thus causally intervenes in the pathomechanism of AGA by reducing the synthesis. Various studies have shown involvement of type 2 out of 5a−reductase in the pathogenesis of AGA. Then came the knowledge that 5a−Reductase type 2 predominates in the hair follicles of the scalp, beard region and the prostate [38].

In experimental studies, the inhibitory effect of alfatradiol on the 5tha −reductase can be detected [37]. In addition, placebo-controlled clinical studies have shown that topical alfatradiol significantly improves the hair status of men and women with AGA and does not cause any systemic undesirable effects [39, 40].

In the present open multicenter study the effectiveness and tolerability of this active ingredient under everyday clinical conditions checked. Essential criteria wa−

Here, the results from trichogram examinations and the subjective judgment of the patient In addition, the level of suffering and the extent of the perceived alopecia were noted over the period of the treatment period.

Patient and method

The present study was carried out at seven selected dermatological centers in Germany. A total of 233 patients with the confirmed diagnosis of AGA took part. In the GCP − compliant test plan, an observation period of 7.5 months (30 weeks - 1 week) was provided, with an intermediate examination (visit 2) after 4 months (16 weeks - 1 week). These specifications could not always be adhered to in practice. Visit 2 took place after an average of 3.6 months and visit 3 after 7.5 months. General information on the duration of treatment refer to these average values.

Patients with AGA were included in the observation, in whom the attending physician had used the active ingredient alfatradiol (Ell-Cranell alpha) for the topical treatment of alopecia. The commercially available finished product was used and dosed in accordance with the instructions for use and specialist information, i.e. the patient was instructed to apply approx. 3 ml once a day to the scalp or the diseased areas using a scalp applicator . After the hair loss or the symptoms had improved, the preparation could be used every 2nd to 3rd day.

A total of 233 patients (192 women, 41 men) took part in the study. The mean age (? Standard deviation) was 40.9? 14.2 years. The age of the female patients was between 14 and 76 years (mean 43.1 to 14.0), that of the men between 17 and 56 years (30.5 to 10.0 years). The ratio of women to men was 4.7: 1 at the start of treatment, 4.2: 1 at the second visit and 5.1: 1 at the third and last visit (Tab.1).

Trichogram examinations were used to objectify the percentage of anagen and telogen hairs before the start of treatment and after 3.6 and 7.5 months of treatment. In order to obtain comparable trichogram results, standardized conditions had to be observed during preparation and epilation. The methodological procedure has already been described several times [z. B. 10, 41 42]. The patients were not allowed to wash their hair five days before hair removal and had to refrain from strong mechanical (tensile) loads. The hair was removed from the front and occipital for diagnosis. However, only the frontally epilated hair was included in the analysis. In the female AGA pattern, epilation was 2 cm behind the frontal hairline and 1 ± 2 cm next to the midline in both men and women. In the male specimen, however, epilation took place at the frontal hairline in the tip of the triangules. The epilation of the 2 to 2.5 cm long, narrow column of approx. 60 ± 80 hairs took place abruptly with a rubberized clamp perpendicular to the direction of growth. The epilated hair was fixed with a strip of adhesive film and placed on a microscope slide. After covering with a cover slip and applying a few drops of water, er−

Tab. 1 Demographic data and findings before starting therapy

	All	Women	Men
Number of patients (N)	233	192	41
Age			
Average age (years)[a]	40.9? 14.2	43.1? 14.0	30.5? 9.8
Age range (years)	14 ± 76	14 ± 76	17 ± 56
Duration of illness			
Median (months)	30th	36	24
Range (months)	1 ± 240	1 ± 240	2 ± 180
Number of patients (%)			
with suffering[b] "Difficult"	37.9 (89)	41.4 (79)	22.0 (9)
with degree of alopecia[b] "Difficult"	35.6 (83)	39.1 (75)	19.5 (8)

[a] Arithmetic mean? Standard deviation
[b] Self-assessment of the patient

the counting of the hair root shapes followed. All anagen hair root types were combined to determine the anagen hair rate.

Before the start of treatment, the patient rated his / her level of suffering on a 3 − point scale (0 = nonexistent, 1 = medium or 2 = severe) and the impression of the severity of the alopecia on the basis of a 4 − point scale −scale (1 = barely perceptible, 2 = easy, 3 = medium, 4 = difficult). After 3.6 months (visit 2) and at the end of therapy after 7.5 months (visit 3), the success of the therapy was again assessed according to the criteria: not successful “, success is noticeable”, ‚success is good “, success is very good Well".

Adverse drug reactions were documented at each visit. At the end of therapy or observation, the patient was also asked about the tolerability of the treatment (1 = very good, 2 = good, 3 = medium, 4 = poor).

statistics

The data collected were evaluated descriptively and analytically. Differences in the anamnestic survey between women and men were exploratory with the help of the t-test or, if the data was not normally distributed, with the help of the Mann-Whitney U-test. The Wilcoxon rank sum test was used for the exploratory analysis of the trichogram results (before vs. after). Since anagen and telogen hair rates are functionally linked, only the anagen hair rate was tested. Statistical significance was determined with p^3 0.05 (two-sided question) assumed. Changes in the hair root status are shown as differences (D%, after ± before) given.

Results

Of the 233 enrolled patients, the data of 186 patients (150 women, 36 men) could be evaluated for visit 2 after an average of 3.6 months of treatment, and for the final third visit (after an average of 7.5

Tab. 2 Clinical findings before starting therapy

	All	Women	Men
Number of patients (N)	233	192	41
Anagen hair percentage (%)a	67.3? 14.0	68.8? 13.4	60.3? 14.6
Telogen hair percentage (%)a	25.2? 11.5	23.8? 10.7	31.7? 13.1
Number of patients (%) with anagen hair portion			
³ 81%	13.3 (31)	15.6 (30)	2.4 (1)
61% ± 80%	62.2 (145)	64.6 (124)	51.2 (21)
41% ± 60%	18.5 (43)	14.6 (28)	36.6 (15)
£ 40%	6.0 (14)	5.2 (10)	9.8 (4)

a Arithmetic mean? Standard deviation

Months) there were still data from 129 patients (108 women, 21 men). The examination appointments were kept on average, 7.4? 1.8 months (mean? Standard deviation) from the first to the third visit and 8.2? 1.9 months. The intermediate visit took place in both sexes after 3.6? 1.1 months.

In the anamnesis, significant differences between women and men were found in terms of age, psychological distress and subjectively perceived severity of alopecia (Tab.1). Before starting treatment, the women rated the severity of their alopecia predominantly as "moderate" or "severe" (mean
3.3 on a scale from 1 to 4), while the men mostly rated the extent of their hair thinning as average '(score - mean 3.0). Correspondingly, the women reported a higher level of suffering compared to the men (average score 1.4 versus 1.2 on a scale of 0 ± 2). The median duration of illness in women was 36 months, 12 months longer than that of men (24 months).

Significant differences in hair status between women and men were also observed in the anamnesis (Tab. 2).
The trichogram examination revealed an average proportion of anagen hair for women and men of 69% and 60%, respectively. The proportion of telogen hair was correspondingly increased in women 24% and men 32% (Tab.2)

Almost half of the men, but just one fifth of the women, suffered from pronounced AGA and had a frontal facial hair proportion of less than 60% (Tab. 2).

During an average of 7.5 months of topical treatment with alfatradiol, the majority of the patients examined improved their hair status, i.e. on average the proportion of anagen hair increased while the proportion of telogen hair decreased accordingly (Fig.1). In relation to the initial value, the proportion of anagen hair in women (n = 92) rose by an average of 8 percentage points, from 69% to 77%, with the proportion of telogen hair falling by an average of 7 percentage points from 25% to 18%. In the men (n = 20) the proportion of anagen hair rose by 9 percentage points from 56% to 65%, accompanied by a decrease in the telogen hair proportion by an average of 7 percentage points from 32%

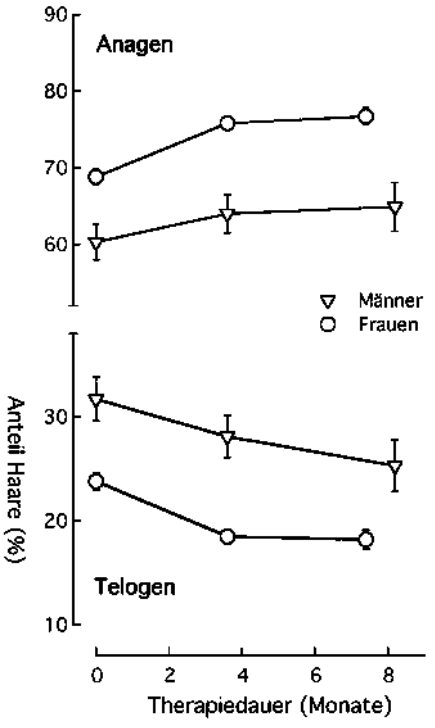

Fig. 1 Anagen and telogen hair rates Men (n = 41, 33, 20) and women (n = 192, 122, 92) on therapy with alfatradiol (0.025%). Therapy–duration is the arithmetic mean of Time from visit 1 (therapy duration = 0) up to visit 2 or visit 3.

Data points are Mean values? Stan–standard deviation.

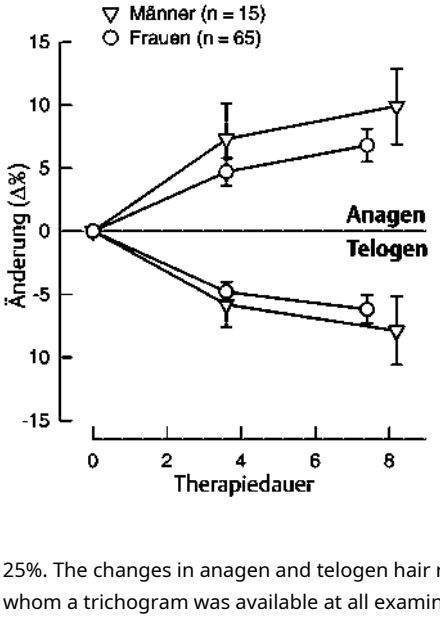

Fig. 2 modification the hair rates below treatment with Alfatradiol (0.025%) relative to the off–input value at Pa–patients with complete digen progressive tri–chograms. Data–points are middle values ? Standard softening.

25%. The changes in anagen and telogen hair rates in the patients for whom a trichogram was available at all examination appointments is shown in Fig.2.

At the interim examination after an average of 3.6 months, the anagen hair rates were statistically significantly different from the initial values in both sexes (P <0.01; Wilcoxon rank sum test). In well over 75% of all history barograms, the rate of anagen hairs was higher than at the start of therapy (Tab.3).

The proportion of patients whose anagen hair rate had remained unchanged or had increased after around 7.5 months of therapy was over 80% in both sexes (women 82/92 = 89%; men 17/20 = 85%). Taking into account all evaluable trichograms at the end of the therapy, i.e. at visit 2 or 3, there was stabilization or improvement

Tab. 3 Mean changes in anagen and telogen hair rates after topical treatment with alfatradiol (0.025%) an average of 3.6 months of therapy (visit 2)

	Women		Men	
	Patients with after- following Visit 3 n = 65	Patients without after- the following Visit 3 n = 57	Patient with after- following Visit 3 n = 15	Patient without after- the following Visit 3 n = 18
Anagen (D%)	4.7	7.0	7.3	1.4
Telogen (D%)	± 4.8	± 7.0	± 5.8	± 3.1

the anagen hair rate at 88% (131/149) the women and at 79% (30/38) of the men, i.e. a total of 86% (161/187) of all patients. The proportion of patients in whom the telogen hair rate had decreased at the end of therapy (visit 2 or 3) or at least remained unchanged was correspondingly large (91% women, 82% men) (Fig.3).

These treatment results, determined in the trichogram for both women and men, were assessed differently by women than by men. Female patients saw therapy success in 80% (129/161) of the cases (success noticeable or better), whereas male patients saw the therapy as successful in 56% (22/39) of the cases. Especially in the categories "good" (women 29.2%, men 5.1%) and "bad" (women 19.9%, men 43.6%), the different evaluations of the female and male patients (Fig. 4).

The treatment was tolerated equally well by women and men. On the 4 − point scale from 1 = "very good" to 4 = "bad", the patients (n = 195) rated the tolerability of the preparation with an average of 2.0 points (average score for women 1.9, men 2.2). Two patients reported a slight burning sensation and one patient reported a feeling of drying out of the scalp. No other local or systemic effects were observed.

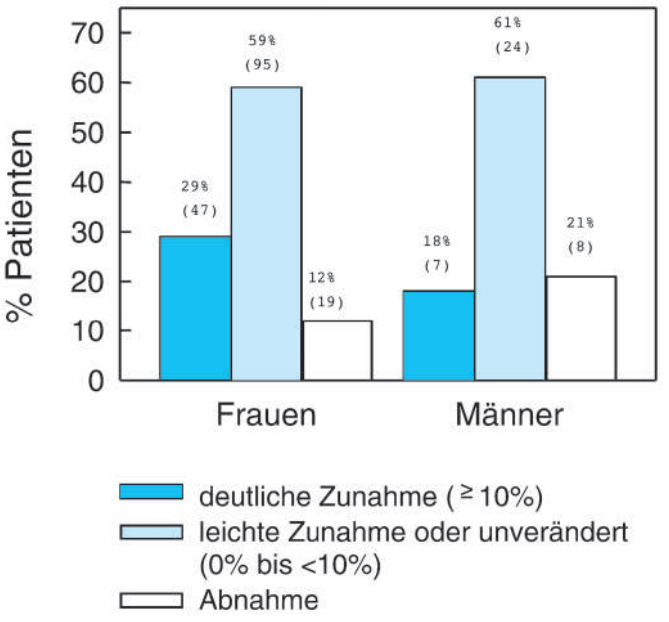

Fig. 3 Change in anagen hair rate with topical treatment with alfatradiol (0.025%) in women and men. Trichogram of the last examination (after 3.6 or 7.5 months) compared to the initial findings.

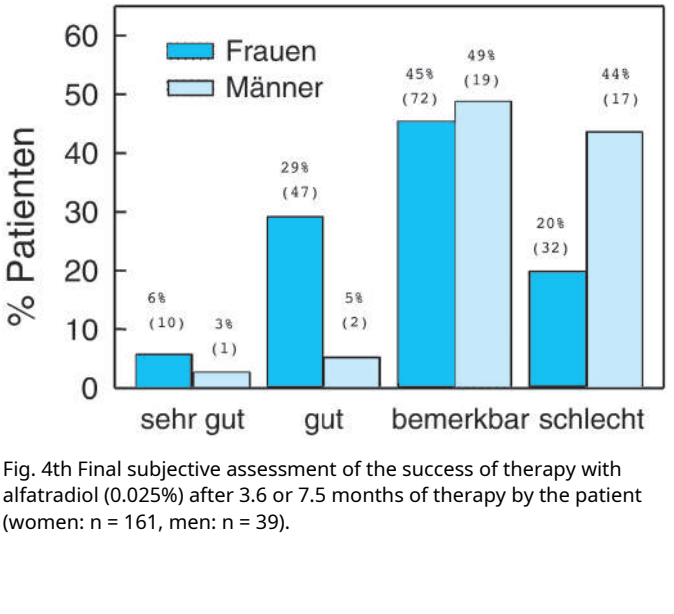

Fig. 4th Final subjective assessment of the success of therapy with alfatradiol (0.025%) after 3.6 or 7.5 months of therapy by the patient (women: n = 161, men: n = 39).

discussion

The open multicenter study with topical alfatradiol reported here lasted around 18 months and included a total of 233 patients with AGA of varying severity. Women were about 4 ± 5 times more likely than men, were on average 13 years older and had suffered from the problem of hair thinning for a longer period of time than the male participants. In the trichogram of the frontally epilated hair, the female patients had on average less telogen hair than the male patients. Compared to male patients, women more often felt high levels of distress and more often rated the extent of their alopecia as severe.

At the second visit after an average of 3.6 months, a total of 186 patients could be evaluated, after around 7.5 months there are still 129 patients. This decrease in the number of participants is within the scope of what can be expected from long-term observation. After the initial visit, only 14% of the patients did not show up. Of the remaining 200 cases, progress barograms could be made for 187 patients (80% of the total collective), either for the intermediate visit (155 cases) or for the final visit (112 cases).

The assumption that primarily patients without sufficient therapeutic success left observation after the second visit cannot be confirmed. Such a trend was only discernible for the male participants. In the group of male patients, for whom a trichogram had also been made on the third visit, there were more therapy results' than in the rest of the group, for whom the second visit was closed

was the last one. In the larger patient collective of female participants, however, such a trend was not discernible; on the contrary, on average, the hair status of those who dropped out was better at the second visit than in those who had come to the third visit (Tab.3).

Overall, there were no significant differences between those patients who had trichograms on all three visits and the collective as a whole with regard to the trichogram findings from the initial examination. It can therefore be assumed that the observation result with regard to the trichological parameters was not significantly influenced by the withdrawal of patients after the first or second visit, even if there was such an influence for the comparatively small group of male patients.

The hair root examination (trichogram) is a standardized and validated method with which treatment differences or the time course of the alopecia can be assessed in a patient collective [10, 43, 44]. Since with AGA the rate of anagen hair is reduced and that of telogen hair is increased, successful therapy should be accompanied by an increase in the anagen hair content while at the same time reducing telogen hair. Maintaining the status quo in AGA therapy is also defined as a therapeutic success. Compliance with the standard conditions, which also require the cooperation of the patient, is critical in this examination procedure. In particular, the hair must not be washed or brushed within 5 days prior to epilation. because otherwise hair loss could be masked. An important criterion in the selection of the centers and practices was therefore proof of a correspondingly large amount of experience with hair root examinations. Furthermore, physiological seasonal fluctuations in the anagen rate can make the assessment more difficult [45]. For the present observation, which lasted a total of 18 months, they are unlikely to have been of great importance.

The increase in the anagen rate was practically a mirror image of the decrease in the telogen rate. To what extent a normalization of the hair rate in the trichogram is also accompanied by a normalization of the hair cycle cannot be answered with certainty. Since the counting of anagen and telogen hair is not carried out independently of one another, an increase in anagen hair could theoretically also result from a shortened telogen phase
[31]. However, no indications of an overall accelerated hair cycle as a result of a lowering of the DHT level on the hair papilla have been found [35, 46].

In people with healthy hair, successive trichogram examinations yield roughly evenly distributed lower or higher anagen hair rates [10]. A significant shift in one direction or the other can be interpreted as evidence of a relevant change in the hair status in the examined collective.

After topical treatment with alfatradiol, the follow-up examinations at the second or third visit were unchanged in the vast majority of cases (86%)

lower (2.1%) or higher (84.0%) anagen hair rates were found than at the start of therapy. Without active treatment, an increase in the anagen hair rate is to be expected in around 50% of the cases in a patient collective with AGA, as has been shown in placebo-controlled studies [39, 40]. The cyclical nature of AGA means that, in a time-limited observation, a certain proportion of patients will always experience a stabilization or positive change in their hair status, even without effective treatment. This percentage is included in the 86% track record (anagen hair percentage unchanged or higher) of the clinical investigation. Nevertheless, it should be noted that for those affected, the chance that the proportion of anagen hair will at least not decrease further under topical treatment with alfatradiol,

This definition of clinical therapeutic success in AGA (maintenance of the status quo, i.e. no further decrease in the proportion of anagen hair or no increase in the proportion of telogen hair) is obviously not seen as a therapeutic success to the same extent as by the treating physician. For many patients, only a noticeably and visibly increased hair density is rated as a therapeutic success. The male patients in particular tended to rate the success of the therapy less than the trichological parameters suggested. Nevertheless, the success of the therapy was at least recognizable for every second male patient. In the female patients, the agreement between the subjective judgment and the objective trichological findings was greater, four out of five women considered the topical therapy to be successful.

It stands to reason that men and women differ with regard to the psychological effects of AGA [47]. Experience shows that even milder forms of AGA can be associated with considerable psychozosial problems [11, 47]. Patients who visit a dermatologist for this type of hair thinning often find the extent of their hair loss severe and feel a correspondingly high level of suffering, even if there is occasionally no correlation with the clinical severity.

The overwhelming majority of the patients in this observation were women for whom systemic AGA therapy with finasteride is generally contraindicated [34]. The systemic inhibition of the 5tha−Reductase to lower the DHT level at the hair follicle harbors the risk of creating an intersexuality in male fetuses, as is the case with a genetic defect in the 5tha−reductase (especially of isotype 2) is the case [48]. The synthetic estrogen derivative alfatradiol has no clinical hormonal effects and can therefore be used without restrictions in both men and women [36]. The decisive advantage of local therapy for androgenetic hair loss with alfatradiol is therefore the safety of use. Both women, for whom finasteride is contraindicated, as I said, and men can be treated effectively with few side effects and with low systemic stress. Clinically relevant adverse effects were not seen either in the present open study or in previous clinical studies [39, 40]. Occasionally there is slight, local un−

tolerance reactions. In the course of a 12-month study with alfatradiol 0.025% (Ell-Cranell alpha), two cases of local reactions were reported among 81 patients (scalp eczema after 3 or 4 months of therapy), which was complete after discontinuation of the alcoholic solution was reversible [39]. In the present observation, two patients reported a slight burning sensation and one patient reported a feeling of desiccation of the scalp. The alcoholic tincture with alfatradiol was therefore well tolerated.

Whether the objective therapeutic success in this study is based solely on a 5a- Reductase inhibition, as already described in many studies as the mechanism of action of alfatradiol [37, 39, 40], or an aromatase activation [28], remains to be clarified.

Overall, this study has shown, in agreement with previous placebo-controlled clinical studies, that affected patients with alfatradiol have a topically effective and safe drug available for the long-term topical therapy of AGA in both women and men.

thanksgiving

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Book review

Practical sclerotherapy. Instructions for sclerotherapy treatment of varicose veins and other indications
K. Hübner (Ed.)
Essen: Viavital, 2005. 240 p., 438 fig., Cart., 35, ± = C.
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The name Klaus Huebner is probably known to anyone interested in phlebology across the country - the longstanding tradition of the Aachen intensive seminars on phlebology, compression therapy and sclerotherapy speaks a clear language. The experiences from practice and teaching have now flowed into this book, supported by well-known phlebologists such as Breu, Rabe or Wildenhues, to name just a few of the authors. The table of contents reveals the broad arc that the book covers: from the history of sclerotherapy and sclerotherapeutics to anatomy, physiology and pathology, diagnostics, therapy and innovative techniques, to related specialist areas, guidelines and practical tips.

The individual chapters are written in great detail and richly illustrated; at the end of each chapter there are references to literature. Interventions, examination techniques or preparations such as the production of foam for sclerotherapy are explained step by step, combined with suitable pictures, tips and information on pitfalls. The writing style is simple and easy to understand. The way in which it is presented shows again and again that practitioners want to write from their everyday lives and pass on their experiences.

The presentation of the sclerotherapy of smaller and larger vessels begins with historical developments and ends with the current versions. Advantages and disadvantages of the techniques and the use of liquids or foams of different production methods are highlighted. The follow-up treatment with tricks, clear timing and discussion of various compression materials is described in detail. Echo sclerotherapy, duplex-supported sclerotherapy and endovenous catheter-supported foam sclerotherapy as recent developments as well as urological and proctological applications round off the picture. The chapter on side effects and incidents is very instructive; it prevents the subject of sclerosis from being dealt with too carelessly.

The good impression is rounded off by the chapter on the results of the last consensus conference on foam sclerotherapy, the German guidelines and recommendations on patient information.

In summary, it can be said that the book is informative and easy to understand. The more than 400 mostly colored illustrations are clear and easy to understand. Important steps or techniques described in the text are clearly illustrated.

Klaus Huebner takes the reader on a journey through sclerotherapy, where facts are conveyed almost en passant while browsing '. Practical sclerotherapy lives up to its name, because it is practice-oriented and a treasure trove of information and tips for beginners and advanced users. If you are looking for scientific papers, you will be disappointed, if you need tangible knowledge for practice, you are spot on.

W. Koenen, Mannheim