
Topical minoxidil in male pattern baldness: Effects of discontinuation of treatment*

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Ten men with male pattern baldness who had been treated with 2% or 3% minoxidil for at least 4 months were evaluated for any changes in scalp hair growth on and off drug. Objective assessments by hair counts showed a mean doubling of nonvellus target scalp hairs on topical minoxidil and loss of most of these recruited hairs when the drug was discontinued. Four of ten men had nonvellus hair counts off topical minoxidil that fell below baseline levels. Thus, hair growth on topical minoxidil is not sustained when the drug is discontinued. (*J AM ACAD DERMATOL* 1987;17:97-101.)

Over the past 3 years, we have followed 233 men with male pattern baldness who have been treated with 2% or 3% topical minoxidil for a minimum of 4 months.^{1,2} All subjects had their hair growth assessed objectively with target area hair counts and photographs and subjectively by investigator and subject evaluation at 1- to 3-month intervals while on active drug. Any subject who was dropped from the study for medical reasons or who wished to discontinue use of topical minoxidil was encouraged to return for the same assessments every 2 months after discontinuation of topical minoxidil. Of 113 men removed from active-drug studies, 10 have returned for follow-up visits and are the focus of this brief report.

METHODS

Study plan

All men were entered into either a placebo-controlled trial of 1 ml of 2% or 3% topical minoxidil applied twice daily (The Upjohn Company, Kalamazoo, MI)

From the Division of Dermatology, Department of Medicine, Duke University Medical Center.

Funded in part by a grant from The Upjohn Company, Kalamazoo, MI.

Accepted for publication March 23, 1987.

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*Publication No. 149 from the Dermatological Research Laboratories of Duke University Medical Center.

for 12 months¹ or a placebo-controlled dose-response study using 0.01%, 0.1%, 1%, or 2% topical minoxidil twice daily with crossover of all subjects to 2% topical minoxidil at 6 months.² We have previously demonstrated that 0.01% and 0.1% topical minoxidil are ineffective doses, that 1% topical minoxidil is probably minimally effective,² and that 2% and 3% topical minoxidil are equally effective in the treatment of male pattern baldness.¹ As we have seen a significant increase in nonvellus hair growth in male pattern baldness after a 4-month treatment period with 2% or 3% topical minoxidil,¹ we made this length of treatment with topical minoxidil a stipulation for assessing a potential change in minoxidil-induced hair growth when the drug was discontinued.

Hair counts were done in a 1-inch diameter vertex target area with hairs clipped to 1/8 inch and vellus, nonvellus, and total hairs counted with standard lighting under 10× magnification by a single observer. Hair counts and standardized photographs were repeated at 2-month intervals, along with subjective hair assessment by investigator and subject. At each 2-month visit, the subject's evaluation of hair growth was compared to that at the time he discontinued topical minoxidil and was rated as either minimal, moderate, or extreme loss, no change, or growth.

Subjects

The 10 men varied in age from 30 to 46 years (mean, 39.7 years) and had a duration of baldness of 6 to 20 years (mean, 14.1 years) (Table I). Nine subjects were white and one was black. Two subjects had pattern IIIv,

Table I. Study subjects who discontinued topical minoxidil use

Pt. No.	Age	Duration of baldness (yr)	Pattern of baldness	Topical minoxidil (%)	Duration topical minoxidil (mo)	Clinical response*
1	42	10	IIIv	2	4	Moderate
2	36	15	IV	2	10	Minimal
3	30	10	IV	2	4	Minimal
4	38	18	IV	2	10	Minimal
5	44	18	IV	3	24	Minimal
6	41	15	IV	3	24	Moderate
7	46	15	V	3	12	Moderate
8	46	6	IIIv	3	8	None
9	41	20	V	3	11	Minimal
10	33	14	IV	3	11	None

*Investigator evaluation.

Table II. Mean target area hair counts on 2% or 3% topical minoxidil

Time of hair count	Type of hair		
	Vellus	Nonvellus	Total
Baseline (\pm SD)	168.2(\pm 181.9)	184.6(\pm 109.4)	352.8(\pm 197.2)
Range	0-512	0-349	109-666
Four months on treatment (\pm SD)	193.3(\pm 175.3)	315.4(\pm 196.54)	507.7(\pm 188.9)
Range	0-524	0-607	168-799
Termination of treatment* (\pm SD)	191.9(\pm 179.2)	374.1(\pm 200.9)	566(\pm 169.1)
Range	0-514	0-634	158-755

*Time range of treatment with topical minoxidil varied from 4 to 24 months.

six had pattern IV, and two had pattern V male pattern baldness prior to discontinuation of the medication.^{3,4} Four men had used 2% topical minoxidil for 4 to 10 months and six men had used 3% topical minoxidil for 8 to 24 months. Reasons for stopping topical minoxidil in these 10 men included lack of efficacy (four subjects), lack of interest (four subjects), or both (two subjects). Two men had been judged by the investigator to have had no growth, five minimal, and three moderate growth on topical minoxidil prior to discontinuation of drug.

Statistical analysis

Simple descriptive statistics were primarily used to analyze the data. The paired T test was used to calculate probabilities and the two-group T test was used to analyze group differences.

RESULTS

The mean target area baseline hair counts for the 10 study subjects are shown in Table II, along

with mean hair counts at 4 months on topical minoxidil and again at termination of topical minoxidil use. There was no significant change in vellus hair counts over the entire study. The change in total target hair counts can then be ascribed to an effect largely dependent on nonvellus hair growth.

There was a significant change in nonvellus target area counts between baseline and 4 months of topical minoxidil use (mean, 130.8 ± 112.1 , $p < 0.05$). There was a significant increase in nonvellus target hair counts with continued use of topical minoxidil: the change in nonvellus target area hairs between baseline and termination of treatment was 189.5 ± 117.0 ($p < 0.05$). The three subjects treated for 24 months had a gain of 74 (36-140) nonvellus hairs over their 1-year counts during the second year of treatment with topical minoxidil.

There was a mean loss of target area vellus,

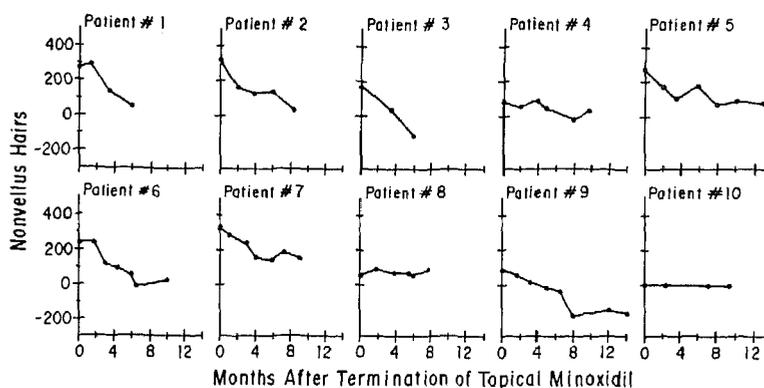
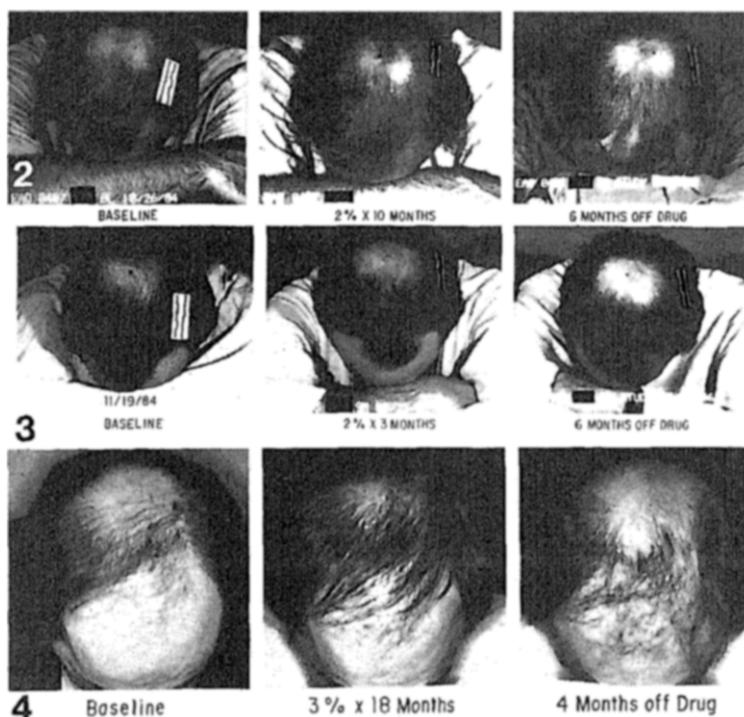


Fig. 1. Change from baseline nonvellus target area hair counts after termination of topical minoxidil.



Figs. 2-4. Subjects before, at termination of, and 4 to 6 months after discontinuation of topical minoxidil.

nonvellus, and total hairs with discontinuation of topical minoxidil. The mean change from baseline hair counts at 6 months off topical minoxidil, the greatest time off topical minoxidil for all 10 subjects, and the mean change from baseline counts for the final hair counts off topical minoxidil are shown in Table III. The final hair count was performed 6 to 13 months off topical minoxidil.

The mean target nonvellus hair counts off topical minoxidil fell to approximately baseline numbers, with the greatest amount of hair loss occurring within 6 months of stopping topical minoxidil. At their final visit, eight men had nonvellus hair counts below their counts at the termination of topical minoxidil visit and four had nonvellus counts below that of baseline (Fig. 1). Hair loss

Table III. Mean change from baseline target area hair counts off topical minoxidil

Time of hair count	Type of hair		
	Vellus	Nonvellus	Total
End of treatment (\pm SD)	23.7(\pm 121.9)	189.5(\pm 117.0)	213.2(\pm 165.4)
Range	-165-300	0-335	2-402
6 months off treatment (\pm SD)	8.6(\pm 153.0)	50.2(\pm 83.7)	58.8(\pm 158.3)
Range	-281-354	-110-164	-224-329
Final visit (\pm SD)	34.4(\pm 164.9)	15.9(\pm 79.2)	50.3(\pm 162.9)
Range	-220-443	-110-149	-249-352

Table IV. Investigator global hair growth evaluation relative to preminoxidil evaluation

Time of hair evaluation	Hair growth	No change	Hair loss		
			Minimal	Moderate	Extreme
6 months off treatment	0	2	6	2	0
Final visit off treatment	0	1	3	6	0

was noted in seven men by their first 2 months off topical minoxidil.

The investigator believed that six subjects had minimal and two subjects had moderate hair loss by 6 months off topical minoxidil therapy. Subject assessment was similar to that of the investigator (Table IV). The severity of the loss was judged to increase with time off therapy. Photographic assessment of three subjects before, at termination of topical minoxidil, and 4 to 6 months after discontinuation of topical minoxidil is shown in Figs. 2 to 4.

DISCUSSION

Two percent or 3% topical minoxidil applied twice daily has been shown to stimulate nonvellus hair growth in men with male pattern baldness.^{1,2,5,6} Prior studies have shown that hair growth is greatest during the first 8 months of topical minoxidil therapy,¹ with little significant hair growth beyond 12 months of treatment.⁷ What happens to this recruited hair growth with discontinuation of topical minoxidil has not been addressed previously.

We showed in this small study that the effect of topical minoxidil in stimulating nonvellus hair growth is not sustained off treatment. Hair loss was most marked within the first 6 months off therapy. Eight of the 10 subjects had nonvellus hair counts fall below their hair counts at the termination of topical minoxidil therapy. Four of the 10 men off drug actually had nonvellus target hair counts fall below baseline levels, perhaps indicating a return to the natural balding process that was interrupted with topical minoxidil therapy.

Certainly, men with male pattern baldness need to be aware that continued treatment with topical minoxidil will be necessary in order to sustain a cosmetically acceptable response. One pertinent question presently being addressed is, "What is the minimal frequency of application of topical minoxidil that is necessary to retain hair growth or prevent further loss?"

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ABSTRACTS

Scleromyxedema: a new therapeutic approach

Puiatti P, Goitre M. *Gior Ital Dermatol Venereol* 1986;121:223-7 (Italian)

Scleromyxedema is an uncommon, chronic cutaneous disease of mucin deposition that has resisted a variety of therapies. The authors report a case of scleromyxedema in a 58-year-old woman with a clinical picture typical of this disease, characterized by lichenoid papules with underlying diffuse thickening of the skin on the face, arms, and trunk. Histologic studies showed the presence of mucin and fibroblasts in the papillary dermis. The serum protein electrophoresis revealed the presence of an accompanying monoclonal paraprotein IgG. Therapy with adrenocorticotrophic hormone, griseofulvin, and extract of fatty acids derived from soya bean and avocado resulted in a progressive improvement of the clinical and histologic picture.

Yehudi M. Felman, M.D.

Acral and oral lesions in pityriasis rosea

Bakos L. *Anais Bras Dermatol* 1986;61:199-201 (Portuguese)

Two cases of pityriasis rosea with involvement of the palms, soles, and tongue are presented; one of the patients had lesions exclusively on these sites. Incidence on these sites is reviewed and differential diagnosis with secondary syphilis is stressed. Examination of the mucous membranes should be included in all cases of pityriasis rosea.

Yehudi M. Felman, M.D.

Association of keratosis punctata palmaris et plantaris with other disorders (premature canities, adenocarcinoma of the colon): A report of seven cases in three families

Ena P, Cottoni F, Cerimele D, Sacgabusi S, Retanda G. *Gior Ital Dermatol Venereol* 1986;121:45-54 (Italian)

Authors report seven cases from three families: F:M sex ratio, 3:1. In the first family a 51-year-old man had keratosis punctata palmaris et plantaris and adenocarcinoma of the colon. Two individuals in this family had keratosis punctata palmaris et plantaris and

cirrhosis of the liver. In a second family a mother and daughter had keratosis punctata palmaris et plantaris and progressive premature canities.

Yehudi M. Felman, M.D.

Detection of herpes virus in gonococci by electron microscopic studies

Dmitriev G. *Vestn Dermatol Venereol* 1986;5:23-4 (Russian)

Secretions from patients with gonococcal infections were examined electron microscopically and a hitherto unknown phenomenon, the existence of herpes simplex virus within the gonococcus, was demonstrated.

Yehudi M. Felman, M.D.

The activity of lysosomal enzymes in plasma neutrophil leukocytes in patients with alopecia areata

Mahkilleison AL, Undritsov VM, Bukina TY. *Vestn Dermatol Venereol* 1986;4:16-8 (Russian)

The activity of lysosomal enzymes of neutrophil leukocytes was studied in 22 patients with alopecia areata. The patients were found to have markedly reduced levels of acid phosphatase, *N*-acetyl hexosaminidase, β -galactosidase, β -glucuronidase, β -glucosidase, cathepsins B and C, and leucine aminopeptidase. The extent of these decreases in lysosomal enzyme levels correlated with the severity of the alopecia areata.

Yehudi M. Felman, M.D.

Nasal rhinosporidiosis: a case report

Mattedi M, Cunha A, Boni ES, Junior LP, Anais Bras *Dermatol* 1986;61:141-4 (Portuguese)

A 12-year-old boy, had a "polyp" in the right nostril that caused obstruction and bleeding. Direct mycologic as well as histopathologic examination demonstrated *Rhinosporidium seeberi*. Surgical removal of the polyp was necessitated by the lack of response to tartar emetic.

Yehudi M. Felman, M.D.