The Effect of Grenz Ray Therapy on Pustulosis Palmoplantaris
A Double-blind Bilateral Trial

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The effect of grenz ray therapy in the treatment of pustulosis palmoplantaris was assessed in 15 patients by randomly allocating active treatment of the lesions of one side of the body, while the lesions on the other side, which received stimulated therapy, served as a control. Four Gy of grenz rays 10 kV were applied on 6 occasions at intervals of 1 week. A significantly better therapeutic result was recorded on the lesions which had received active grenz ray therapy. However, the therapeutic response was moderate. It is concluded that grenz ray therapy could be useful in pustulosis palmoplantaris mainly as an adjunct to other therapies. Key word: Ionizing radiation.

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Various therapeutic principles are used in the treatment of pustulosis palmoplantaris, but the results are usually unpredictable and not always successful. When corticosteroids, tar, and dithranol work poorly, there are few treatment modalities left. PUVA, etretinate alone or in combination (1) have proved to be effective but distressing side effects are frequent. Grenz ray therapy has been used in the treatment of psoriasis for more than 65 years with encouraging results (2) and the side effects of grenz ray therapy have also proved to be few and mild when certain therapy recommendations are followed (2). The present double-blind placebo-controlled trial was, therefore, designed to assess the efficiency of grenz ray therapy on pustulosis palmoplantaris. The exposure dose, kV and fractionation of the grenz ray therapy is the standard regime which has been used at the Department of Dermatology, Karolinska Hospital, Stockholm, for several decades.

PATIENT AND METHODS

Patients
Seventeen patients with pustulosis palmoplantaris took part in the study (median age 54 years, range 26–84 years). Duration of disease was: median 3 years, range 0.5–35 years. The patients had been untreated for at least 3 weeks before the start of the study, except for 2% salicylic acid in

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Table 1. Improvement in score after grenz ray therapy and placebo in 15 patients with pustulosis palmoplantaris (4 Gy x 6, 1 wk interval).

<table>
<thead>
<tr>
<th></th>
<th>After treatment (n=15)</th>
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<tbody>
<tr>
<td>Grenz rays better</td>
<td>13</td>
</tr>
<tr>
<td>Placebo better</td>
<td>1</td>
</tr>
<tr>
<td>No difference</td>
<td>1</td>
</tr>
<tr>
<td>( p^*</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

\( p^* \) Mc Nemar's test

petrolatum. The patients were also encouraged to use this emollient throughout the study. No other treatments were allowed. The patients had moderate to severe pustulosis palmoplantaris. Nine patients had lesions both on feet and palms and 8 patients had lesions only on feet.

**Grenz rays**

The grenz ray machine factors were 10kV, 30mA, half-value layer 0.02 mm Al., half-value depth in tissue 0.5 mm, focus-skin distance 10 cm.

**Experimental procedure**

The design of the study was that of a double-blind trial. Each patient received 4 Gy of grenz rays given on 6 occasions at intervals of 1 week. The lesions on one hand or/and foot received active treatment, the other side was treated with placebo. This was done by allowing the apparatus to hum without irradiation. The nurse treating the patient gave the active radiation or placebo treatment according to a randomized predetermined code. Neither the patient nor the evaluating doctor knew which side had received active grenz ray therapy.

**Clinical assessments**

Clinical evaluation was done before grenz ray therapy, after the 6th treatment and 6 weeks after treatment. Photographs of the lesions were obtained prior to the grenz ray treatment in all patients. The observer made a graded assessment of the lesions of each side of the body. The symptoms assessed were erythema, scaling, itching, pustulation and distribution (size of the affected area). A 5-grade scale was employed, where 0 denoted absence of symptoms and 4 denoted very severe symptoms. A visual analogue scale was employed to estimate itching by patient. This analogue scale was then transformed to a 5-grade scale by the observer. Total score was estimated by adding the scores for each symptom. In case the patients received treatment on both a foot and a palm, the total score was the sum of the two scores. Active treatment was then given also to the lesions of the former placebo-treated side of the patient and the side first treated was followed up when this treatment was finished. Any side effects were recorded during the period.

**RESULTS**

The results are summarized in Table I and Fig. 1. All patients were smokers and 2 had a history of thyroid disease. Of the 17 patients who started the trial, 2 patients failed to participate throughout the study. One patient withdrew because of a severe flare up reaction of psoriasis on other parts of the body and one elderly patient withdrew because of illness. Thus, 15 patients completed the treatment period of 6 weeks. Eleven of them also received treatment on the previously placebo-treated side and 4 patients preferred to withdraw after the initial treatment period.

A greater improvement on the hand and/or foot receiving active grenz ray therapy was found significantly more often at 6 weeks \( (p<0.01) \) (Table I). The mean total scores were lower on the hands and/or feet receiving grenz rays than those receiving placebo at 6 weeks. However, the decrease in score after treatment was moderate (Fig. 1). No local or systemic adverse reactions were noted. Particularly no pigmentation of the soles or palms were observed.

**DISCUSSION**

In this study it has been shown that grenz ray therapy has a significantly better effect on pustulosis palmoplantaris than placebo treatment. However, this response was moderate. No lesions healed com-

![Fig. 1. Total scores for severity of pustulosis palmoplantaris (PPP) on grenz ray (■) and placebo (□) treated side; before, after 6 weeks of treatment (n=15) and 6 weeks after treatment (n=11). Vertical range bars show standard deviation.](image-url)
The Effects of Tetracyclines and Erythromycin on Complement Activation In vitro

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The effects of tetracycline, minocycline and erythromycin on complement activation in vitro were studied. At concentrations of 100 mg/l or less, these antibiotics did not inhibit the capacity of Propionibacterium acnes to cleave C3 in normal human serum or in serum chelated of Ca²⁺ allowing complement activation by the alternative pathway alone. The antibiotics had no effect (at 100 mg/l) on total haemolytic activity of complement in normal human serum. This study did not provide evidence to support the hypothesis that the efficacy of these antibiotics in the therapy of inflammatory acne vulgaris can be explained by inhibition of complement activation.

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Tetracycline and erythromycin antibiotics have been used for many years in the treatment of acne vulgaris. However, their mode of action in this disease is not fully understood. It has been suggested that antibacterial activity alone is not sufficient to explain their beneficial effects and that interaction with host defence mechanisms may contribute to their efficacy (1). One of the earliest histologically-apparent signs of inflammation in acne lesions is the deposition of complement C3 at the basement membrane zone of the majority of comedones and in the walls of adjacent dermal blood vessels (2,3). The demonstration of C3, in the absence of immunoglobulins and C1q, has been interpreted as alternative pathway activation of complement (2,3). The contents of acne lesions have been shown to activate complement by the classical pathway (4) and individually expressed comedones have been shown to activate complement by the alternative pathway in vitro (5). The extent of complement activation has been shown to correlate with numbers of Propionibacterium acnes present in comedonal extracts (5).

The tetracycline antibiotics have been shown to depress the bacteriocidal activity of human serum (6). It has been suggested that this effect was due to impairment of complement activation by the alternative pathway (6). In view of the possibility that the efficacy of these antibiotics in acne therapy might be explained, at least in part, by inhibition of complement activation, this study was undertaken to test the effects of tetracycline, minocycline and erythromycin on complement activation in vitro.

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