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THE TREATMENT OF HYPERHIDROSIS WITH TOPICAL PROPANTHELINE—A NEW TECHNIQUE

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SUMMARY.—The effectiveness of topical propantheline (Probanthine) aerosol in suppressing hyperhidrosis is confirmed in a trial carried out on 38 institutionalized, mentally subnormal patients. One foot was treated, the other served as a control. Macerative keratolysis was reduced and the growth of new skin promoted, most of this improvement lasting for more than 1 month. The treatment dried rapidly and was cosmetically acceptable. An inert aerosol was not effective.

DANISH work in the early 1960s showed that propantheline, when taken systemically, was able to control hyperhidrosis (Sylvest, 1960). Later, topical propantheline in a 5% solution in equal parts of ethanol and glycerol was found to be effective, better results being obtained in the axillae and feet than on the hands (Knudsen and Meier, 1963a; Sylvest, 1963; Søbbye and Nørholm, 1963). These workers were impressed with the freedom from the atropine-like side effects which usually accompanied effective systemic treatment. Controlled trials were carried out to confirm its efficiency and its use thrice daily was suggested. It was noted that the lotion took "10–15 min to dry" (Søbbye and Nørholm, 1963). It was also shown quantitatively that a 5% propantheline lotion significantly reduced sweating in normal non-hyperhidrotic skin (Knudsen and Meier, 1963b). Other topical anti-sweating agents are based mainly on aluminium salts, formalin and simple antiseptics such as hexachlorophene; the majority of preparations available for cosmetic use on healthy skin are also based on these compounds (Hibbert, 1963).

The problem of plantar hyperhidrosis can be considerable amongst institutionalized patients, and was met by one of us responsible for the dermatological care in a large hospital for subnormal patients. A pilot trial with 4 severe cases of plantar hyperhidrosis was conducted, using 5% or 10% propantheline in the ethanol and glycerol base. Treatment and assessment were carried out as detailed below for the full scale investigation. The results were distinctly encouraging, but it was noted that the lotions took approximately 40 min to dry at room temperature and that a pungent odour clung to the hands of the male nurse administering treatment. An aerosol preparation was made available and evaluated as follows:

INVESTIGATIONS

Thirty-eight institutionalized, mentally subnormal patients with hyperhidrosis were studied. The condition was treated as a symptom, no attempt being made to assess the aetiology. Our personal feeling is that, even although they are mentally subnormal,

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many of these patients are not exempt from the exogenous stress reactions which are commonly associated with the condition (Champion, 1968).

Propantheline was delivered in metered amounts from an aerosol. Two strengths were used to investigate dose/response. The right foot was treated twice daily for 3 weeks, and the untreated left foot again used as control. The feet and socks were washed daily. The patients were randomly divided into 2 groups, 1 with 1.85 mg per dose (low dosage), the other 3.60 mg (high dosage). Each treatment consisted of 3 metered doses from the aerosol, 1 to the dorsum of the foot, 1 between the toe clefts from below, and 1 on the plantar aspect of the foot. Assessments were made initially by both of us and then weekly for 3 weeks by 1 observer (JCF), and finally 4 weeks after stopping treatment. The following criteria were considered as best estimating the degree of foot sweating:

- (1) Visible sweating.
- (2) Macerative keratolysis, (keratolysis plantaris sulcatum), as described by Acton and McGuire (1930, 1931), Blank (1963), Sarkany (1965) and Beare (1968).
- (3) Livid erythema.
- (4) New skin growth.

Each was assessed on a 4-point scale by 1 observer throughout, as detailed in Table I. Whether the keratolysis is due to infection (Sarkany, 1965) or sweating cannot be assessed in this paper. While patients in the hospital were being assessed for erythrasma (Somerville *et al.*, 1970) Drs Noble and Somerville (1970) examined for us 17 suffering from keratolysis; organisms like *Actinomyces keratolítica* were not found, and only normal flora were demonstrated on culture.

RESULTS

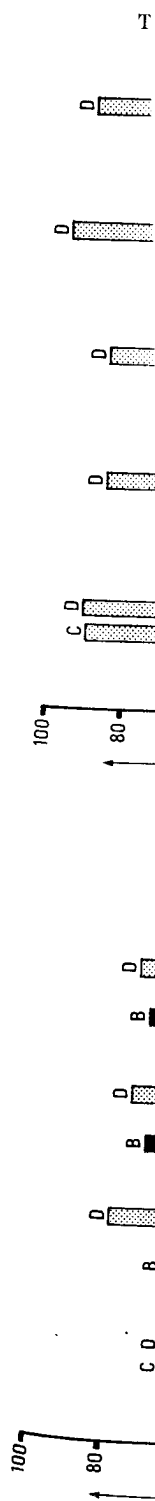
The 4 criteria are considered separately.

(1) *Visible sweating*.—Because most normal feet sweat a little, it was felt that complete suppression of sweating was not the desired end point and that the category "mild sweating" represented the normal state. In fact no patient became completely anhidrotic as a result of treatment. We have, therefore, recorded (Fig. 1) the number and percentage of patients in whom sweating was considered to be excessive (i.e. moderate and severe categories) at each assessment. The beneficial results under this criterion are self-evident in Fig. 1, improving continuously throughout the 3-week treatment period. The improvement was not maintained 1 month after therapy ceased. The evaluation of the χ^2 statistic for these results shows that they are significantly different from their controls: $p < 0.005$ for low dosage group; $p < 0.025$ for high dosage group.

(2) *Macerative keratolysis*.—Only 3 of the 38 patients achieved a complete remission of this feature, and these were in the low dosage group. There was a considerable reduction in severity in the treated groups, as can be seen in Fig. 2, which records the percentage of patients suffering from moderate or severe macerative keratolysis at each assessment. Both treatments were effective, the improvement being maintained 1 month after therapy. However, the results are significant for low dosage group only where $p < 0.001$.

(3) *Livid erythema*.—Therapy had little effect, and only in the most severe cases was any improvement seen. Both treatment groups fared slightly better than their respective control groups, but the differences were not statistically significant (Fig. 3).

(4) *New skin growth*.—Most patients with hyperhidrosis as a clinical problem were found to have a degree of macerative keratolysis, and the induction of new



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