DISCUSSION

The present observation indicates that acitretin monotherapy is effective in the management of ACH. A further reduction of the dosage needed might be achieved by combining retinoids with classical topical antipsoriatics.

The LTB_4-induced intra-epidermal accumulation of PMN is a practical approach to study the migration of PMN through the skin. Already after 1 month of acitretin treatment at a dosage of 35 mg per day, the migration of these cells proved to be markedly inhibited. This observation further illustrates the effectivity of relatively low doses of acitretin.

ACKNOWLEDGEMENTS

The authors wish to thank Professor B. M. Czarnetzki and Dr J. M. Geiger for helpful discussion. Ro 10-1670 was kindly provided by Hoffmann-La Roche (Mijdrecht, The Netherlands, and Basle, Switzerland).

REFERENCES

1. Braun-Falco O, Berthold D, Ruzicka Th. Psoriasis pustulosa generalisata. Klassifikation, Klinik und Therapie. Hautarzt 1987; 38: 509–520.
2. Pearson LH, Allen BS, Smith JG. Acrodermatitis continua of Hallopeau: treatment with etretinate and review of relapsing pustular eruptions of the hands and feet. J Am Acad Dermatol 1984; 11: 755–762.
3. Camp R, Russell Jones R, Brain S, Woollard P, Greaves M. Production of intraepidermal microabscesses by topical application of leukotriene B_4. J Invest Dermatol 1984; 82: 202–204.
4. Van de Kerkhof PCM, Bauer FW, Maassen-de Grood RM. Methotrexate inhibits the leukotriene B_4 induced accumulation of polymorphonuclear leukocytes. Br J Dermatol 1985; 113: 251a–255a.
5. Lammers AM, van de Kerkhof PCM, Schalkwijk J, Mier PD. Elastase, a marker for neutrophils in skin infiltrates. Br J Dermatol 1986; 115: 181–186.

Treatment of Hyperhidrosis Manuum by Tap Water Iontophoresis

JENS CHRISTIAN DAHL and LENE GLENT-MADSEN

Department of Dermatology, Odense University Hospital, Odense, Denmark

In a randomised, double-blind, controlled clinical trial of the effect of treatment with tap water iontophoresis, 11 patients with palmar hyperhidrosis were treated actively on one hand and with placebo on the other. The patients' sweat production was 100 % higher (median) than measured in control subjects of the same age and sex. Prior to iontophoresis, the patient's sweat production was the same on both hands but after treatment it was reduced significantly on the treated hand ($p < 0.01$) compared with the sweat production prior to treatment as well as with that of the untreated side. An 81 % reduction (median) in sweating was found in 6 patients receiving maintenance treatment every second week. *Key words: Antiperspirant; Sweating.*

(Accepted December 20, 1988.)

Acta Derm Venereol (Stockh) 1989; 69: 346–348.

J. C. Dahl, Kastrup Skin Clinic, 168 Saltværksvej, DK-2770 Copenhagen, Denmark.

Emotional hyperhidrosis affects axillae, palms and soles. Tap water iontophoresis treatment of this condition has been known for more than fifty years but has not been in common use until recently (1). A number of studies (1–5) have demonstrated an effect but a double-blind, controlled clinical study has never been carried out before.

The purpose of this study was to demonstrate the therapeutic effect of tap water iontophoresis treatment on emotional palmar hyperhidrosis.

MATERIAL AND METHODS

A randomised, double-blind, controlled clinical study of a group of patients with palmar hyperhidrosis treated actively on one hand and with placebo on the other.

A direct current (DC) generator (test model from Dermatron, 77 Tagensvej, DK-2200 Copenhagen) was used, securing a steady current in spite of alternating resistance. The generator produced 0–20 mA DC in two independent circuits with a maximum voltage of 30 V. A blind disconnection of one of the circuits was possible. Two aluminium plates measuring 12×31 cm and 13.5×21 cm were used as anode and cathode, respectively. The plates were fixed in cold tap water baths (6) and were covered with a plastic grill to protect the skin from burns. The palms were placed at the anodes and the soles at the cathodes so that the sole and palm of the same side were part of the same circu
any, were covered with a thin l
treatment (7). The current of eac
the maximum intensity which th
After randomisation with an e
circuits was broken double-blinc
ferent steps, of which half broke
other half the other circuit. The s
the treatments of an individual
mary randomisation. Each treat
(8). Initially, treatments were gi
the patients reported good sub
nance treatment was given with
ty acceptable to the patients anc
the patients' choice.

The study was performed on 1
with emotional palmar hyperhic
ment of Dermatology, Odense U
dian age was 25 years (range 18–
drosis was stopped two weeks
pared with subjects of the same
tive hyperhidrosis, the sweat p
hands (measured as described
creased by 100 % (median; 1st
and 166 %, respectively). After t
tients continued on maintenan
with moderate objective progres
to insufficient subjective effect.
objective result of treatment st
unknown reasons, respectively.

Immediately after the first
asked to try to determine whi
Sweating was measured before a
series and after 3 months of n
being wiped dry the hands wer
under plastic gloves tied at the
emotional sweat stimulation th
the gloves were removed and th
$g \times 10^{-4}$.

Pratt's Rank Sum Test for pa
statistical analysis (10). The test
in accordance with the Helsink

RESULTS

The actively treated side
patients and incorrectly by
blinding of the patients.

A median current of 4 mA
administered 6 to 12 times
before the patients reporte
Pretreatment sweating wa
($p \gg 0.1$). Following the ini
production was reduced by
quartiles were 7 % and 53 %
sweat production was sig
pared with the untreated s

side were part of the same circuit. Wounds and scratches, if any, were covered with a thin layer of petrolatum prior to treatment (7). The current of each circuit was set at precisely the maximum intensity which the patient was unable to feel. After randomisation with an envelope system one of the circuits was broken double-blind by a regulator with six different steps, of which half broke one of the circuits and the other half the other circuit. The same circuit was broken in all the treatments of an individual patient according to the primary randomisation. Each treatment lasted fifteen minutes (8). Initially, treatments were given 1 to 5 times a week until the patients reported good subjective effect. The maintenance treatment was given with the strongest current intensity acceptable to the patients and with intervals according to the patients' choice.

The study was performed on 8 female and 3 male patients with emotional palmar hyperhidrosis referred to the Department of Dermatology, Odense University Hospital. The median age was 25 years (range 18–44). All treatment of hyperhidrosis was stopped two weeks before iontophoresis. Compared with subjects of the same age and sex without subjective hyperhidrosis, the sweat production from the patients' hands (measured as described below) was found to be increased by 100% (median; 1st and 3rd quartiles were 54% and 166%, respectively). After the initial treatments, six patients continued on maintenance treatment. Three patients with moderate objective progress of treatment stopped owing to insufficient subjective effect. Two patients with improved objective result of treatment stopped owing to personal and unknown reasons, respectively.

Immediately after the first treatment the patients were asked to try to determine which side was actively treated. Sweating was measured before and after the initial treatment series and after 3 months of maintenance treatment: After being wiped dry the hands were inserted into cotton gloves under plastic gloves tied at the wrists. After ten minutes of emotional sweat stimulation through mathematical tests (9), the gloves were removed and the weight increase measured in $g \times 10^{-4}$.

Pratt's Rank Sum Test for paired data was applied for the statistical analysis (10). The test was designed and performed in accordance with the Helsinki Declaration II.

RESULTS

The actively treated side was given correctly by 6 patients and incorrectly by 5, which supports the true blinding of the patients.

A median current of 4 mA (range 2 mA–10mA) was administered 6 to 12 times (median: 10 treatments) before the patients reported good subjective effect. Pretreatment sweating was equal on both sides ($p \gg 0.1$). Following the initial treatment serie sweat production was reduced by 38% (median; 1st and 3rd quartiles were 7% and 53%, respectively). The fall in sweat production was significant ($p < 0.01$). Compared with the untreated side, the sweat production was reduced by 32% (median; 1st and 3rd quartiles were 17% and 56%, respectively), which was also significant ($p < 0.01$).

All maintenance treated patients preferred treatment every second week. A median current of 10 mA (range 7 mA–14 mA) was applied. After 3 months of maintenance treatment sweating was found to be reduced by 81% (median; 1st and 3rd quartiles were 60% and 95%, respectively, $p < 0.05$).

No side effects were observed in any patient.

DISCUSSION

The study showed none of the side-effects described in the past as soreness, erythema, vesicles, and even bullae and burns (4, 7, 11). The highest current intensity tolerated without side-effects was 0.3 mA/cm^2–0.5 mA/cm^2 (8, 11). Owing to the lack of protection between electrodes and hands, a patient who came in too close contact with the electrodes at a later treatment (current intensity 14 mA), developed multiple deep bullae (12). The determining factor thus seems to be the direct contact with the electrodes in small areas which increases the applied current per cm^2 uncontrollably.

The number of treatments necessary for good subjective effect depends on the frequency of the treatments given, which is variably indicated in the literature. The median number of 10 treatments in our study was comparable with the number of treatments in other recent studies (2, 4). However, the applied median current of 10 mA during the maintenance treatment was less than the current used by others (2, 4). This may be due to the application of different types of electrodes. The median current of 4 mA used in the initial double-blind study was not optimal as the sweat reduction was further increased from 38% to 81% with an increase in current to the maximum tolerable value of 10 mA. The patients' preferred treatment interval of two weeks as well as the demonstrated sweat reduction of 81% were comparable with the results in other studies (2, 4). However, the effect of treatment may be less if other types of iontophoretic devices are used (13, 14). Local treatment with aluminium chloride hexahydrate in absolute ethanol has been applied to hyperhidrosis manuum reducing sweating by 66% (15). Tap water iontophoresis thus seems to be the most effective local treatment of hyperhidrosis manuum.

REFERENCES

1. Sloan JB, Soltani K. Iontophoresis in dermatology. J Am Acad Dermatol 1986; 15: 671–684.
2. Hölzle E, Pauli M, Braun-Falco O. Leitungswasser-Iontophorese zur Behandlung von Hyperhidrosis manuum et pedum. Hautarzt 1984; 35: 142–147.
3. Boumann HD, Lentzer EMG. The treatment of hyperhidrosis of hands and feet with constant current. Am J Phys Med 1952; 31: 158–169.
4. Hölzle E, Alberti N. Long-term efficacy and side effects of tap water iontophoresis of palmoplantar hyperhidrosis—the usefulness of home therapy. Dermatologica 1987; 175: 126–135.
5. Stolman LP. Treatment of excess sweating of the palms by iontophoresis. Arch Dermatol 1987; 123: 893–896.
6. Zankel HT. Effect of physical modalities upon Ra I^{131} iontophoresis. Arch Phys Med Rehabil 1963; 44: 93–97.
7. Levit F. Treatment of hyperhidrosis by tap water iontophoresis. Cutis 1980; 26: 192–194.
8. Shrivastava SN, Singh G. Tap water iontophoresis in palmo-plantar hyperhidrosis. Br J Dermatol 1977; 96: 189–195.
9. Quatrale RP, Stoner KL, Felger CB. A method for the study of emotional sweating. J Soc Cosmet Chem 1977; 28: 91–101.
10. Rahe AJ. Tables of critical values for the Pratt matched pair signed rank statistic. J Am Stat Assoc 1974; 69: 368–373.
11. Zlotogorski A, Shafran A. Iontophoresis in dermatology. J Am Acad Dermatol 1987; 17: 690.
12. Dahl JC. Iontoforesebehandling af emotional hyperhidrose. Månedsskrift for praktisk lægegerning (in press).
13. Akins DL, Meisenheimer JL, Dobson RL. Efficacy of the Drionic unit in the treatment of hyperhidrosis. J Am Acad Dermatol 1987; 16: 828–832.
14. Hölzle E, Ruzicka T. Treatment of hyperhidrosis by a battery-operated iontophoretic device. Dermatologica 1986; 172: 41–47.
15. Jensen O, Karlsmark T. Palmoplantar hyperhidrosis. Treatment with alcoholic solution of aluminium chloride hexahydrate: a simple method of transpiration measurement. Dermatologica 1980; 161: 133–135.

Treatment of Scabies with Permethrin Versus Lindane and Benzyl Benzoate

UWE-FRITHJOF HAUSTEIN and BARBARA HLAWA

Department of Dermatology, School of Medicine, Karl Marx University, Leipzig, GDR

This open clinical study was designed to evaluate and compare the efficacy and side effects of lindane (1% and 0.3%), benzyl benzoate (20% and 10%) and permethrin (5% and 2.5%) after two, three, and one application at bedtime, in the treatment of scabies in 114 adults and 80 children aged between 0 and 5 years. Treatment failures were registered after lindane in 3 adults and 2 children, whereas benzyl benzoate and permethrin cured all patients as assessed after a 3-week follow-up. The number of irritations and post-scabious eczematous reactions was increased after benzyl benzoate treatment. Permethrin proved to be very reliable and exhibited few side effects when applied once at bedtime. Because of the percutaneous absorption and neurotoxicity of lindane, the application of permethrin can be recommended as a useful alternative in premature infants and small children, patients with seizures and neurological complications, in cases of therapeutic failure with lindane the treatment needs to be repeated, in scabies crustosa, as well as in children, pregnant women and nursing mothers.

(Accepted January 31, 1989.)

Acta Derm Venereol (Stockh) 1989; 69: 348–351.

U.-F. Haustein, Department of Dermatology, School of Medicine, Karl Marx University, Liebigstr. 21, Leipzig, GDR-7010.

For 30 to 40 years the insectizide lindane (γ-hexachlorcyclohexane) has been known to be effective and reliable in the treatment of scabies (1), even in children, pregnant women and nursing mothers (2). It is neither a mutagen nor a teratogen. Lindane has a LD_{50} of 90 mg/kg in mice and exerts neurotoxic effects, especially upon the central nervous system, due to its lipophilic properties (3). In recent years, side-effects of lindane such as irritability, nervousness, apprehension, insomnia, seizures, apathy, coma, respiratory arrest and death (4) were reported repeatedly in isolated cases of small children (5, 6) and patients with neurological disorders. In most cases this was attributed to abuse, overuse or treatment failure, or even to accidental ingestion. On the other hand small amounts of epicutaneously applied lindane (in particular on wet, inflamed or excoriated skin in small