Thus, compared with most other countries in which similar studies have been made, D.D.T. residues in human fat in Great Britain remain at a very low level, and indeed there has been an apparent decline in the general levels of all the pesticide residues. This could be regarded as a comparatively satisfactory state of affairs.

We should like to thank those pathologists throughout the country who have helped by providing samples and those members of the staff of the Laboratory of the Government Chemist who have assisted in the analysis of the samples. Thanks are also due to Mr. O. F. Newman for the statistical analyses. This report is published by permission of the Government Chemist (Ministry of Technology) and the Ministry of Health.

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Tinea Incognito

F. ADRIAN IVE,* M.B., M.R.C.P.; RONALD MARKS,* M.B., B.SC., M.R.C.P., D.T.M.&H.

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Summary: Fourteen cases are described in which the local application of corticosteroid preparations to ringworm infections of the skin have resulted in unusual clinical pictures. A kerion-like lesion due to Trichophyton rubrum, intertriginous infections simulating candidiasis and due to Epidermophyton floccosum, and pictures resembling poikiloderma, papular rosacea, and indeterminate leprosy are among the changes that were seen in these patients.

Introduction

Dermatology has been greatly helped in recent years by the introduction of a variety of potent therapeutic agents. While this has often meant that diseases are easier to control it has also resulted in an increase of iatrogenic disease.

Corticosteroid ointments tend to be used as a dermatological panacea and the misuse of these powerful agents is often the cause of commonly observed iatrogenic skin disease. While the frequently disastrous results of the systemic abuse of corticosteroids have been well documented there are few references to the problems that result from their inappropriate topical application (Grice, 1966).

Dermatologists have become increasingly aware that the clinical appearance of some rather common skin diseases may be rendered almost unrecognizable by topical steroids and particularly by the use of their fluorinated derivatives. This applies especially to those dermatoses in which the use of these compounds is normally contraindicated.

A principal action of corticosteroids is to suppress inflammation, and when administered systemically they can hinder immune responses. In this way they may contribute significantly to the morbidity of infective disease of all types, specific examples being bacterial infections such as tuberculosis, viral infections such as chicken-pox, and fungal diseases such as ringworm (Kligman, Baldridge, Rebell, and Pillsbury, 1951). Extensive tinea corporis is a well-documented complication of Cushing's disease (Canizares, Shatin, and Kellert, 1959). Thus it is surprising to find that corticosteroids are not infrequently used in the management of infective skin disease. This situation probably derives in part from the tendency of patients to indulge in self-medication with hoarded ointments. In most instances, however, it would appear to stem from the recognition, by doctors, of the undoubted ability of steroids to provide prompt relief of symptoms by the suppression of inflammation. Systemic immune responses can usually contain the infection, and patient satisfaction is assured. This appertains especially in herpes simplex, when the risk of promoting keratitis is often disregarded.

Impetigo, scabies, and specifically ringworm infections are also often mistakenly treated by local corticosteroid preparations and sometimes even by systemic administration. The bizarre clinical pictures which ensue can tax the most expert diagnostician. The following cases illustrate the difficulties resulting from the use of local corticosteroids in the treatment of superficial fungus infections.

Case Reports

Case 1.—A West Indian woman aged 31 complained of an irritating rash that started in the groins and spread to the adjoining thighs. She had been given Synalar (fluocinolone acetonide) and Betnovate (betamethasone-17-valerate), which brought transient symptomatic relief only. On examination there were well-defined patches which were non-scaly, depigmented, purplish, and telangiectatic. Fungal mycelium was seen in a scraping of the involved skin and *Epidermophyton floccosum* was grown from skin scales. She was treated with half-strength Whitfield's ointment and was clear after three weeks.

Case 2.—A woman aged 71 had a rash on the feet and ankles for the previous year. She had used betamethasone under poly-

* Senior Registrar, St. John's Hospital for Diseases of the Skin, London W.C.2.

ethylene occlusion. The rash was red and scaly and had a well-defined edge. It extended over the occluded area like a pair of socks. *Trichophyton rubrum* was grown and she was much improved after four weeks' treatment with griseofulvin and Whitfield's ointment.

Case 3.—A 23-year-old man had since the age of 17 had various itchy rashes diagnosed as seborrhoeic dermatitis. On examination there was a macular plum-red non-scaly rash around the right eye (Fig. 1), in the groins, and on the sides of the neck, with poorly defined margins. He had used fluocinolone ointment and other local steroid applications. An examination for fungus showed the presence of ringworm type mycelium in the skin around the eye and on the groins. *E. floccosum* was grown from all areas. His rash cleared after one month on griseofulvin and Tinaderm (tolnaftate) cream.

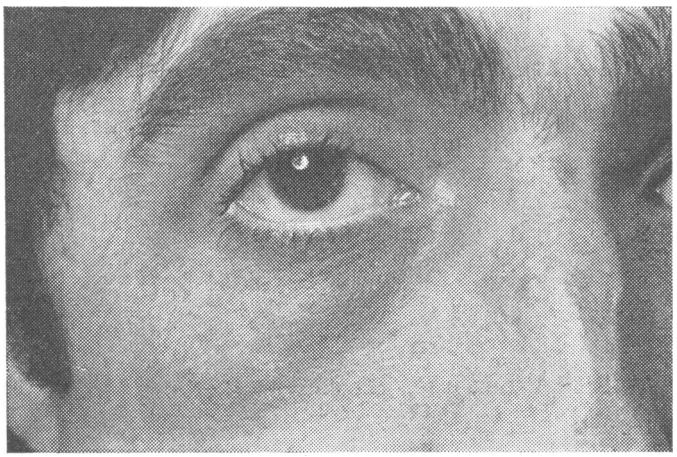

FIG. 1.—Case 3. Ringworm of unusual appearance around the eye.

Case 4.—A 53-year-old woman had had lichen simplex on the right forearm and elbow since 1955, which was controlled by the use of fluocinolone ointment. In January 1966 she developed a rash in the groins, under the breasts, and in both axillae which was bright red, scaly, and cracked in places, with tiny outlying satellite pustules which suggested candidiasis. There was also scaling between the toes. She used betamethasone to each patch as it developed. Microscopical examination of scales showed a ringworm fungal mycelium, and *E. floccosum* was grown from all sites. She was treated with griseofulvin and undecenoate ointment, and had much improved after six weeks.

Case 5.—A woman aged 45 complained of a rash under the breasts and in the axillae for the previous six months. The clinical diagnosis was candidal intertrigo, but scaling was noted in the toe webs. She had used various preparations, including Synalar-N. Microscopical examination showed a ringworm fungal mycelium in all sites and *E. floccosum* was cultured. She was treated with half-strength Whitfield's ointment topically and griseofulvin and was clinically clear in less than three months.

FIG. 2.—Case 7. *T. rubrum* folliculitis of lower leg.

Case 6.—A man aged 25 had had a rash in the groins for the previous three months and multiple boils for the previous five or six weeks. He had used many proprietary steroid preparations to the area in the groins. On examination there was a well-defined mauvish rash in the groins. Its surface was slightly scaly and telangiectatic. Ringworm fungus mycelial filaments were seen in scrapings from both groins and toe webs. Complete clearing occurred after six weeks on oral griseofulvin and local half-strength Whitfield's ointment.

Case 7.—A 19-year-old female laboratory technician was given betamethasone cream by her practitioner for spots on the legs diagnosed as insect bites. No improvement resulted after four months of this treatment. When seen in the dermatology clinic there was an indurated area below the left knee (Fig. 2) in which prominent erythematous plugged and excoriated hair follicles were clearly visible. The clinical diagnosis was "folliculitis," and only on mycological examination could the correct diagnosis of tinea corporis be made. *T. rubrum* was grown from this area and the lesion cleared after five weeks' treatment with griseofulvin 250 mg. twice daily and Castellani's paint locally.

Case 8.—A 67-year-old man had a two-year history of intense irritation over the upper chest wall and buttocks. His doctor had treated him with Remiderm (triamcinolone acetonide with halquinol), betamethasone, fluocinolone, and Ultralanum (fluocortolone 21-hexanoate). On examination there was an extensive rash over the upper part of the front of the chest and root of the neck. It was light tan in colour, flat, non-indurated, and could be seen only with difficulty (Fig. 3). The lesion on the buttocks was also smooth and non-scaly, but the light red colour and its serpiginous border suggested ringworm. *T. rubrum* was grown from both areas and from the soles of the feet. He was cleared after one month's treatment with griseofulvin 250 mg. twice daily and local Whitfield's ointment.

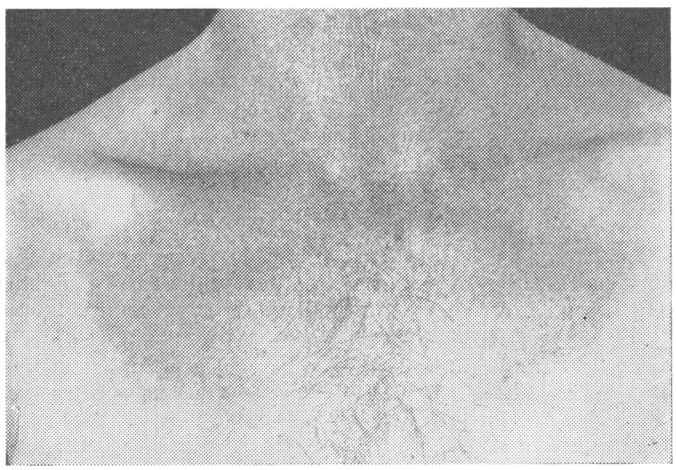

FIG 3.—Case 8. Extensive atypical tinea corporis.

Case 9.—A youth aged 18 was diagnosed as having "dhobi itch" by his doctor but was given Propaderm (beclomethasone dipropionate) and fluocortolone to apply to the affected area. The rash altered in appearance during the next three months but the itching persisted. On examination he had broad mauve striae distensae on the inner aspect of the upper thighs. No scaling was evident and the surrounding skin looked clinically normal. Microscopical examination of skin scales showed a ringworm fungal mycelium. His symptoms subsided on griseofulvin and tolnaftate cream but the striae persisted.

Case 10.—A youth aged 19 gave a six-month history of rash in the groins which had been treated with fluocinolone and betamethasone. On examination a confluent and vivid erythematous rash was seen. On closer inspection there was an appearance of atrophy, scaling was minimal, and many telangiectases were seen within the area. Ringworm fungal mycelium was found in scrapings from

the site. The lesion responded to treatment with Whitfield's ointment.

Case 11.—A 50-year-old man developed red rings on his face three months previous to being seen in the clinic. A dermatologist had diagnosed erythema annulare centrifugum. This seemed to respond to treatment with oral antihistamines and local betamethasone cream. After six weeks of this treatment he developed an inflammatory lesion on the left side of the upper lip. When seen two weeks later he had developed an indurated area studded with pustules and partially covered with a yellow crust on the upper lip (Fig. 4). There was also faint erythema and scaliness on the soles suggestive of tinea pedis. The lesion on the lip was diagnosed as kerion clinically and a large spored ectothrix type of fungus was seen microscopically. *T. rubrum* was grown both from the kerion and the soles. He was treated with griseofulvin 125 mg. four times a day and with Whitfield's ointment locally. He was completely cleared after three months.

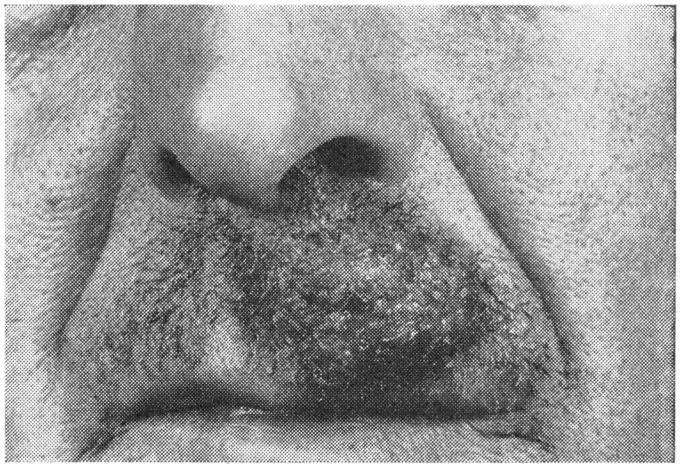

FIG. 4.—Case 11. Kerion due to *T. rubrum.*

Case 12.—A 66-year-old woman with a 40-year history of psoriasis attended with a four-month history of a reddened eruption on the antecubital fossae, to which she had been applying betamethasone without effect. The areas were found to be red and atrophic with multiple fine telangiectases (Fig. 5). Clinical diagnoses of atrophic morphoea and poikiloderma were entertained. The diagnosis of ringworm was made only on biopsy examination after finding mycelia in the stratum corneum. *E. floccosum* was grown from skin scrapings from the area and she responded completely to a month's course of griseofulvin and Whitfield's ointment locally.

FIG. 5.—Case 12. Poikilodermatous area on forearm.

Case 13.—A woman aged 39 presented with a nine-month history of a spreading rash on the face. She had had a rash on the left palm for the previous two years which was irritant, red, and slightly scaly and which cracked in the cold weather. The rash on the face started at the corner of the mouth and spread outwards ; it was red, non-scaly, and there were many minute flat-topped papules. Though the eruption was diffusely distributed over the face a clinical diagnosis of rosacea had been suggested (Fig. 6). She had been treated with betamethasone and many other local steroid preparations. A mycological examination confirmed the presence of abundant fungal mycelium in scrapings from the face and the hand.

FIG. 6.—Case 13. Micropapules of cheeks and eyelids simulating a form of rosacea.

Case 14.—A 28-year-old Indian man had had a rash on his hand for many years. For two months he had noted a rash on his face and applied fluocinolone and fluocortolone regularly. On examination there was a marginated hypopigmentation of the whole front of his face with minimal scaling and no erythema. Sensation was normal and a biopsy specimen taken to exclude leprosy showed eczematous changes only. At this stage the fairly obvious fungal lesion on the hand was noted and ringworm mycelia were seen microscopically in scrapings from both areas. He subsequently cleared on griseofulvin and Tinaderm.

Discussion

From the clinical material presented above some points of interest arise. In general the clinical pictures that resulted from the application of topical corticosteroids to ringworm infections were bizarre and difficult to recognize, but in one patient (Case 2) it was typical in appearance though of unusual extent.

Ringworm fungi metabolize dead keratin, and their presence in the horny layer evokes an eczematous response in the viable epidermis beneath. Eczematous skin is a poor producer of keratin and so, deprived of foodstuff, fungous infections tend to resolve (Pillsbury, Shelley, and Kligman, 1956). It can be seen that topical steroids, by suppressing the eczema, may encourage fungal growth. In addition apparent enhancement of the virulence of ringworm organisms by suppression of local immune responses may occur. A similar situation has recently been noted in which local overgrowth of candida due to steroid applications has complicated oral lichen planus (Cawson, 1968) and otitis externa (R. A. Williams, personal communication, 1968), where eradication can prove extremely difficult. The appearance of tinea after topical application of such potent steroids as fluocinolone acetonide or betamethasone-17-valerate is probably determined, in varying proportions, by the above two considerations.

Apparent increased virulence resulting in eruptions in unusual sites and of unusual extent and appearance was seen

in Cases 4 and 5 where involvement of intertriginous areas simulated candidiasis, and also in Cases 3, 13, and 14 where non-flexural skin became involved. An extreme degree of this artificially boosted virulence is exemplified by Cases 7 and 11, where *T. rubrum* invaded hair follicles to cause kerion and folliculitis. This fungus has very rarely been implicated in kerion formation. The local action of corticosteroid preparations in producing striae distensae in sites of application is well recognized (Epstein, Epstein, and Epstein, 1963 ; Meara, 1964), and Case 9 is an example of this reaction.

Case 10 illustrates a feature that was seen in several of our patients which does not appear to have been described before and will be the subject of a fuller communication (Munro, 1968). The affected area in these patients showed atrophy and telangiectasia without scaling, giving the skin a translucent and poikilodermatous appearance. In Case 12 this occurred on the arm and gave rise to extreme diagnostic difficulty, but in Cases 1, 3, 6, and 10 groin involvement suggested the correct diagnosis.

Hypopigmentation was seen in both coloured patients (Cases 1 and 14). This phenomenon does not usually follow resolution of ringworm after orthodox treatment and was confusing in Case 14, where a diagnosis of leprosy was initially entertained.

Case 13 was seen by several dermatologists before the correct diagnosis was made. The micropapules on her face were more suggestive of a type of rosacea than ringworm, and only the recognition of modified tinea elsewhere on her body suggested the correct diagnosis.

In the present context the old adage of diagnosis before treatment is probably impracticable in most general practices. It should be more widely known that skin scrapings may be taken for mycological examination as easily as bacteriological swabs. None the less it is likely that cases of masked ringworm will continue to occur. In our opinion the best form of prophylaxis is an increased awareness of tinea, especially in cases of groin and unilateral hand eruptions.

We wish to thank the consultants of St. John's Hospital for Diseases of the Skin, Dr. R. Marten and Dr. E. L. Rhodes, for details of patients under their care. We are indebted to Dr. Y. Clayton and the Department of Mycology at St. John's for the mycological investigations.

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Lead Poisoning in Blind Children

A. C. AMES,* M.B., B.S., B.SC., M.C.PATH. ; P. N. SWIFT,† M.R.C.P.

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Summary: Many partially sighted children use the mouth, lips, and tongue as an aid in identifying objects—this has been termed discriminatory pica. Investigation of a case of lead poisoning in a pupil at a residential school for the blind led to the discovery of others with asymptomatic lead poisoning, all of whom had the same habit.

All the children recovered without treatment when they abandoned their habit of discrimination by use of the mouth. Authorities responsible for schools for the blind should be aware of this risk.

Introduction

The occurrence of symptomatic lead encephalopathy in one pupil at a residential school for the blind induced us to investigate other clinically normal pupils for lead intoxication. Several of these were found to have raised blood lead levels. We report the findings of the survey carried out at the school to identify the lead source and discuss their implications in the training and supervision of blind children.

Case Report

A boy aged 7 years who is partially blind on account of bilateral congenital cataracts was referred to the hospital outpatient clinic in March 1967 because of a history of periodic tingling in his tongue and a "funny feeling" in his head over a period of several months. He had recently suffered two major epileptic seizures.

On physical examination no relevant abnormality was detected and the skull *x*-ray picture was normal. On 15 March the haemoglobin was 84% (12.5 g./100 ml.), E.S.R. 2 mm. in one hour (Westergren), total W.B.C. count 5,000/cu. mm., blood sugar 76 mg./100 ml., and blood lead 116 μg./100 ml. (normal range <35 μg./100 ml.).

Penicillamine 600 mg. daily was given for 42 days (total 25.2 g.). Repeat blood lead on 21 April was 50 μg./100 ml. and on 18 December 33 μg./100 ml.

Progress.—Anticonvulsant therapy (phenobarbitone 30 mg. b.d.) was maintained, but three further major seizures occurred four months after his course of penicillamine. Since August he has remained well. Questioning about possible sources of lead ingestion revealed that he was in the habit of chewing everything from toys to radio components. Furthermore, he utilized lip and tongue sensation to identify objects and assess their texture. It seems that the exploratory pica so often found in young children and well developed in this patient had gone beyond this stage as an additional sensory mechanism performing a useful function. We differentiate this acquired form of pica by the term "discriminatory pica." He also used algebra and arithmetic type composed of metal stated by the manufacturers to contain 65% lead, 25% antimony, and 10% tin. Each type has raised dots on one face and a raised bar on the other face, which when set at different angles in a frame represents different numbers. This boy used the tongue to identify each type before placing it in the frame.

Survey to Detect Other Cases of Lead Poisoning

After the recognition of the first case 10 pupils were selected on the basis of their having a history of discriminatory pica,

* Senior Registrar in Chemical Pathology; Lewisham Hospital, London S.E.13.
† Consultant Paediatrician, Farnborough, Orpington, and Sevenoaks Hospitals, Kent.