The Distribution Patterns of Psoriasis:

Observations on the Koebner Response

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ABSTRACT

Observation of the Koebner response was used in the clinical evaluation, determination of prognosis and management of seven patients with psoriasis. The Koebner response may be observed in patients with progressive and eruptive psoriasis; it is not the etiological factor but determines the localization of lesions when a psoriatic reaction is active. The eliciting stimuli for response are varied and non-specific; a common factor is cutaneous injury. Other skin diseases may provoke suitable eliciting cutaneous injury and determine the distribution patterns of sebo-psoriasis, psoriasis inversus, and psoriasiform neurodermatitis. Cutaneous injury is followed by repair or an attempt at repair. Psoriasis is a reaction pattern to non-specific stimuli in which psoriatic defect is brought to light by the increased rate of metabolism in cells regenerating after injury.

ANY part of the cutaneous surface may be involved in psoriasis. The function of the hair follicle is unimpaired and hair growth continues in the presence of psoriasis of the scalp. The nails are frequently affected; the mucous membranes rarely so. Production of sebum appears to continue. Sweating ceases at affected sites and may not be activated by cholinergic stimuli for months after clinical healing.

The distribution patterns vary from a solitary patch to universal exfoliating erythroderma. There is a tendency to certain distinctive types and the sites most commonly affected are the extensor surfaces of the knees and elbows and the lumbosacral region. Willan[1] stated that "the scaly patches are generally situated where the bone is nearest the surface, as along the shin, about the elbow, and upon the ulna in the forearm, on the scalp and along the spine, os ilium and shoulder blades".

Next in frequency is a distribution in the axillary and anogenital skin folds (psoriasis inversus).

Koebner[2] stated in 1873 that "superficial irritation of the horny layer during the outbreak of universal psoriasis had about a week after, as a result, the appearance of small psoriasis nodules in the streak". In 1876, he described a patient in whom psoriatic lesions appeared "exactly at the site and in the shape of excoriation from horse-back riding, the bite of a horse and tattoos".[3]

Patients with progressive and eruptive psoriasis show this response to factors which cannot be regarded as etiological but rather as determining the localization of lesions when the psoriatic process is active. Types of eliciting stimuli have been listed by Shelley and Arthur,[4] as follows:

"*Experimental* – scarification, electrodessication, tape stripping, primary irritant.

Clinical–bites (insect, animal), burn, dermatitis, drug reaction, excoriation, incision, lichen planus, lymphangitis, miliaria, photosensitivity, pityriasis rosea, pressure (belt, truss, arch support), radiation (ultraviolet light, grenz ray), skin tests (scratch, injection, tuberculin), vaccination, vitiligo, zoster".

Psoriasis may also localize on tattoos, sparing a cinnabar (mercuric sulfide)-stained portion. Psoriatic lesions have been observed to have been superimposed on varicella, lupus erythematosus and neurodermatitis disseminata.[5] Barber stated:[6] "There is another observation which illustrates again that psoriasis is a mode of reaction of the skin of certain persons under the influence of various determinants; the eruption may replace the simple hyperkeratosis of keratoderma climactericum, the common neurodermatitis of the nape of the neck, and the more usual secondary papulopustular eruption in rosacea."

These observations indicate that psoriasis may localize at the sites of many different types of cutaneous injury, a phenomenon referred to as the Koebner response. The following clinical examples illustrate some eliciting stimuli.

Dermatitis Actinica

CASE 1.—The lower limbs of a white female, aged 67, were treated for psoriasis by ultraviolet irradiation, and acute dermatitis developed on previously uninvolved skin of the thighs. The straight upper border of the eruption (Fig. 1) corresponded with the upper edge of her stockings. The eruption on the thighs became less pruritic and developed into confluent psoriasis. The photograph (Fig. 1) was taken at this stage, and the plaques of psoriasis cleared after four months. The patch test to ammoniated mercury was positive. The patient probably contaminated the upper thicker part of her stockings with ammoniated mercury ointment used on the legs.

This case is cited as an example of the Koebner response elicited by actinic and chemico-allergic injury.

Dermatitis Venenata

CASE 2.—A white male, aged 71, noted an exacerbation of psoriasis of 30 years' duration. Ultraviolet ther-

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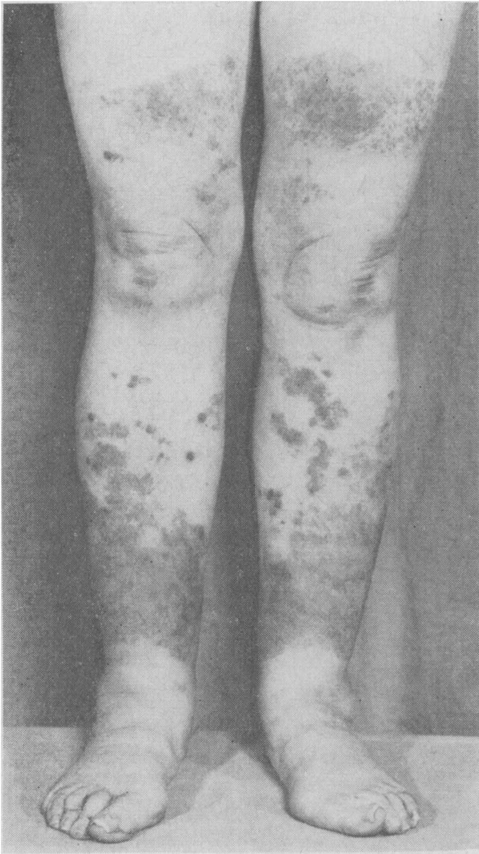

Fig. 1

apy caused pruritus and spread of the eruption. He had bilateral atherosclerotic disease which occluded the right femoropopliteal artery and caused severe ischemia and rest-pain in the right foot. After right lumbar sympathectomy, pruritic confluent psoriasis appeared at the sites of preoperative application of tincture of iodine. Two months after operation the edematous right foot continued to give pain at rest and showed confluent psoriasis.

The Koebner response was elicited three times in this case: ultraviolet irradiation, given in an eruptive phase, aggravated chronic psoriasis, and chemical irritation provoked extension of psoriasis around the site of operation. Psoriasis was more extensive on the right than on the left foot, and the eliciting stimulus here was cutaneous injury occasioned by peripheral vascular disease.

Dermatitis Hypostatica

CASE 3.—A white male, aged 75, showed inveterate psoriatic plaques on the arms, and labile guttate and nummular lesions on the trunk. The skin of the legs showed confluent, dry, scaling, dull erythema from knee to ankle in a stocking distribution. On many occasions during a five-year period, the eruption on the trunk was observed to involute spontaneously and to recur. During the phases of disappearance of the eruption on the trunk, the eruption on the legs simultaneously disappeared, leaving brown pigmentation.

Psoriasis was localizing on skin affected by senile asteatosis and xerosis and by past dermatitis hypostatica and dermatitis venenata.

Sebopsoriasis, Psoriasis Inversus, and Psoriasiform Neurodermatitis as Manifestations of the Koebner Response

It is suggested that dermatitis seborrheica, intertrigo and neurodermatitis may provide the eliciting stimuli which determine the localization of these variants.

(a) *Dermatitis seborrheica.*—Figs. 2 and 3 show lesions on the face and forehead. These patients presented with psoriatic lesions on the scalp, trunk and limbs. Usually psoriasis of the scalp presents marginated, scaling, nummular patches in contrast to the diffuse scaling of dermatitis seborrheica. The scaling of psoriasis is dry while seborrheic scaling may be dry or oily. Extension of dermatitis seborrheica to the forehead tends to be symmetrical and

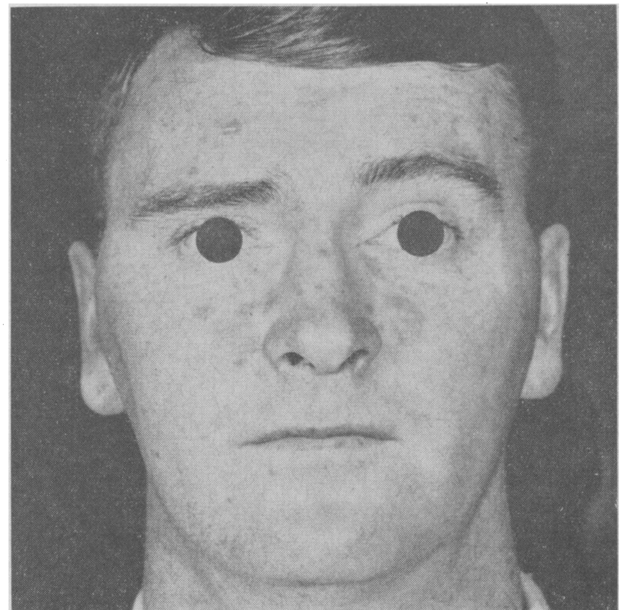

Fig. 2.—Lesions of the face.

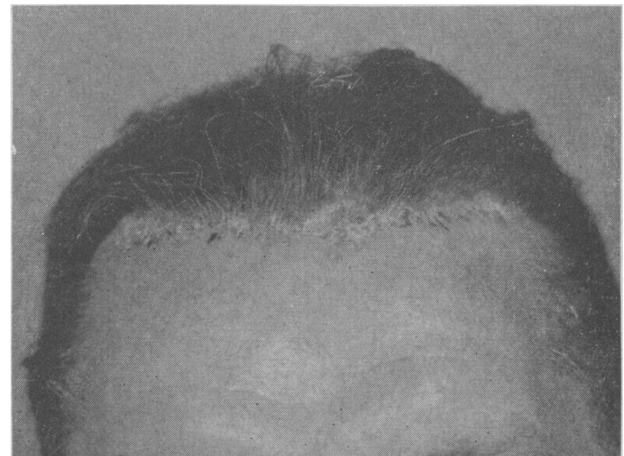

Fig. 3.—Lesions of the forehead.

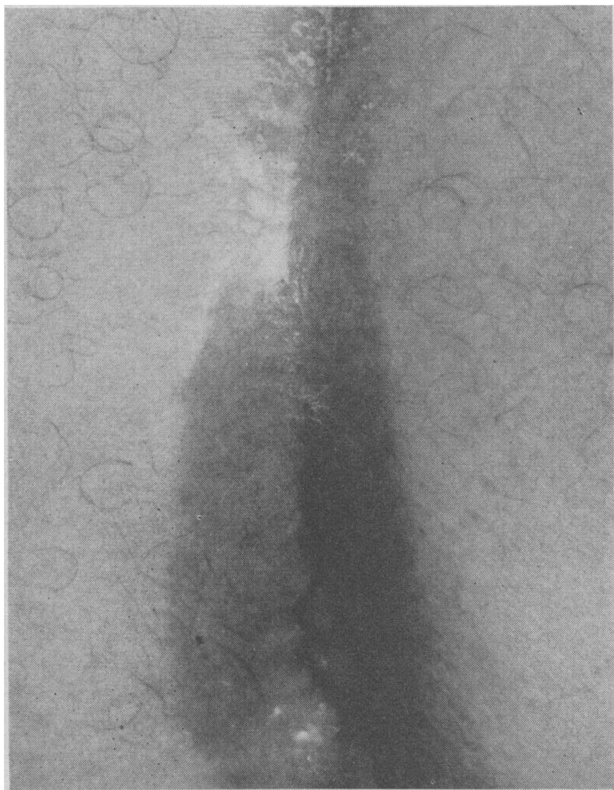

Fig. 4.—Psoriasis inversus.

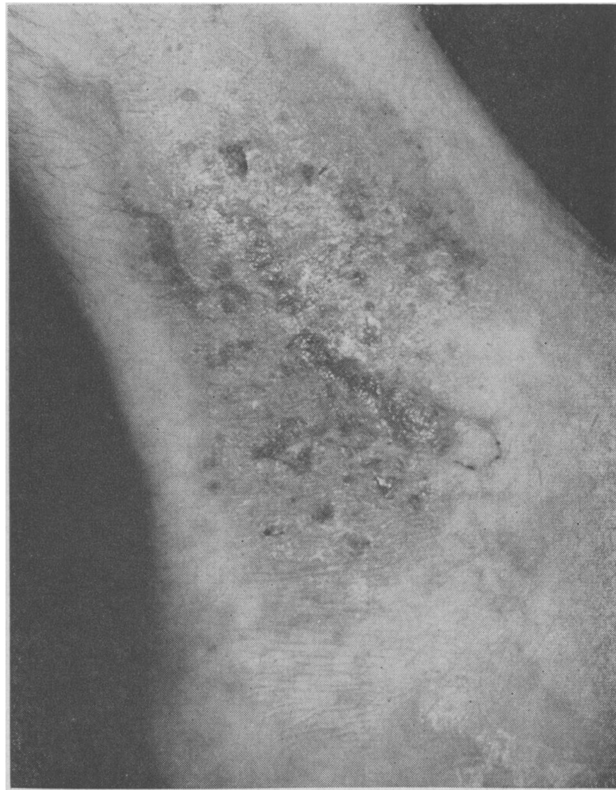

Fig. 5.—Lichenified psoriasis.

gives the clinical appearance of corona seborrheica, which is clinically similar to corona psoriatica. Psoriasis of the scalp is more resistant to therapy than dermatitis seborrheica. These patients showed little response to anti-seborrheic remedies, but ultraviolet irradiation resulted in improvement.

In such cases it appears in order to make a diagnosis of psoriasis of the scalp and face with a tendency to a seborrheic pattern. This condition might be named sebo-psoriasis, a term which indicates a mixed clinical picture of these two disorders. Unna[7] has stated, "It is by no means easy in every case to separate psoriasis from an equally widespread disease—seborrheic eczema—and very frequently psoriatic papules pass into squamous, crusted or even weeping, seborrheic ones." It has been suggested[8] that these two disorders merge into one another, or that dermatitis seborrheica may change clinically into psoriasis or that psoriasis may change into dermatitis seborrheica.

(b) *Intertrigo.*—Some patients in whom psoriasis involved the axillary, inframammary and anogenital regions (psoriasis inversus) were seborrheic subjects. In other cases there were no seborrheic eruptions on the scalp, face, neck, presternal and interscapular skin, and the distribution appeared to be intertriginous (Fig. 4).

(c) *Psoriasiform neurodermatitis (lichenified psoriasis).*—Some patients with psoriatic lesions on the trunk and limbs presented one or more lichenified and excoriated lesions (Fig. 5). After application of occlusive dressings, psoriatic features became apparent.

Clinical Application of Knowledge of the Koebner Response

A psoriatic patient showing involvement of intertriginous areas should be advised concerning hygiene, correction of obesity and relief of hyperhidrosis. Management of lichenified psoriasis includes investigation and treatment of neurodermatitis.

In cases of acute psoriasis, the skin should not be subjected to strong and irritating topical therapy. Ultraviolet irradiation and "strong" topical therapy which "burns the disease off the patient" may result in efflorescence of the disease. Usually the psoriatic process is favourably altered by these agents, but in progressive and eruptive disease, cutaneous injury by dermatitis actinica or dermatitis venenata elicits the Koebner response. Then, the results outweigh the usual favourable effects of therapy.

Observation of the Koebner response is helpful in prognosis. When psoriasis appears at sites of cutaneous injury, the disease is eruptive, and bland topical therapy is desirable. When scratches and abrasions on a patient's skin are observed to heal without leading to the appearance of psoriasis, then the tide has turned, the patient may be reassured that further spread is less likely, and more intensive topical therapy may be started.

It is desirable to protect the skin from injury in a broad sense, as part of the treatment of psoriasis.

DISCUSSION

Theories about the clinical manifestations of psoriasis are plentiful and a statement that psoriasis

represents a reaction pattern of the skin to various stimuli is by no means new.[6, 8] However, a hypothesis that the presence of another skin disease may provide the eliciting stimulus for the Koebner response provides a unifying concept to explain the clinical manifestations of sebo-psoriasis, psoriasis inversus and psoriasiform neurodermatitis and offers a guide to therapeutic management.

It is difficult to evaluate the history in patients with these mixed disorders and to decide whether the other skin disease preceded the appearance of psoriasis in a patient with a tendency to psoriasis. Histopathological studies of atypical lesions of psoriasis that have been carried out during the preparation of this paper are in accord with those reported previously[9, 10] and do not determine whether the other skin disease predisposed the skin to, or preceded the development of, psoriasis. Experimental evidence that seborrhea, intertrigo and neurodermatitis can provoke a psoriatic response is lacking.

A study which will be described in a separate report[11] appears to resolve one difficulty. It is postulated that intertrigo is an eliciting stimulus, but it is known that psoriatic lesions are anhidrotic.[12] An explanation is, therefore, required for the moist and macerated clinical appearance of psoriatic lesions in some skin folds. The aforementioned study indicated that lesions of psoriasis inversus are, in fact, anhidrotic, and the moisture results from spread of sweat from adjacent uninvolved skin, vesiculation of the epidermis, serum exudate and insensible perspiration. Intertrigo can, therefore, exist in the presence of psoriasis.

This concept of psoriasis provides a guide in the evaluation of clinical manifestations and in therapy. It points to the necessity for caution, during presently active basic research, in selecting lesions for pathological and histochemical study. If a psoriatic lesion has been superimposed on another skin disease, basic studies of psoriasis may be confused by abnormalities peculiar to the underlying disorder. Evaluation of therapy must include consideration of the effects on some non-psoriatic component of the disorder under investigation. Since the result of any form of cutaneous injury is repair, or an attempt at repair, this concept lends weight to the view that the psoriatic defect is one which is brought to light by an increased rate of metabolism in cells regenerating after injury.

SUMMARY

The Koebner response represents the localization of psoriatic lesions at the sites of different types of cutaneous injury. A review is made of reported eliciting stimuli for the response and additional illustrative clinical examples are described. The presence of skin diseases other than psoriasis may determine the distribution of psoriatic lesions and it is suggested that this concept explains the distribution patterns of sebopsoriasis, psoriasis inversus and psoriasiform neurodermatitis (lichenified psoriasis). Knowledge of the Koebner response is of value in the evaluation, management and determination of prognosis of psoriasis.

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PAGES OUT OF THE PAST: FROM THE JOURNAL OF FIFTY YEARS AGO

MEDICINE AND ENGLISH LITERATURE

Of all these men, who have contributed with varying degrees of distinction to English literature, it is curious to observe that Dr. Holmes alone has, so to speak, superimposed his vocation upon his avocation, and keeps us constantly reminded that it is a medical man who holds the pen . . . Holmes fashioned his medical knowledge into prose fiction, into essays, into poetry—and fashioned it so deftly that his works constitute the immortal meeting-ground of medicine and English literature. "The universe swam in an ocean of similitudes and analogies" for Dr. Holmes; and if it was the pathologist who wrote "Elsie Venner," it was the biologist who coined the immortal similitude of the "Chambered Nautilus." What, moreover, could surpass the delightful effrontery of that passage in the "Autocrat", where the doctor discovers that the young lady is in love because her breathing becomes thoracic . . .

There was a moment in the closing years of Dr. Holmes's life when he was compelled to balance these two things, his medical achievements and his literary creation, over against each other. It was Dr. Osler who forced the issue by writing a letter to Dr. Holmes, asking which he valued more, "the 'Essay on Puerperal Fever,' which has probably saved many more lives than any individual gynaecologist, or the 'Chambered Nautilus' which had given pleasure to so many thousands."

"I think I will not answer the question you put to me," wrote Dr. Holmes in reply. "I had a savage pleasure, I confess, in handling those two professors . . . But in writing the poem, I was filled with a better feeling—the highest state of mental exaltation and the most crystalline clairvoyance, as it seemed to me, that had ever been granted to me . . . There is more selfish pleasure to be had out of the poem—perhaps a nobler satisfaction from the life-saving labour."

So spoke the innate modesty which always went hand in hand with the good doctor's frank liking for the things that were his. Explicitly the question remained unanswered, but who shall say that the soul of the doctor did not answer it as we should have done, or that the scales fluctuated long when medicine and literature were thus weighed in the balance?—Edmund Kemper Broadus, Ph.D., *Canad. Med. Ass. J.*, 2: 915, 1912.