RESULTS

HLA-B39 frequencies of the patients with PsA are shown in Table I. The most striking feature is the high prevalence of B39 in the group with axial arthritis.

DISCUSSION

Early reports stated that HLA-B38 was elevated in PsA (3, 4, 5). Further studies showed an increase in both B38 and B39 frequencies (6) as well as B39 alone (7).

In our study we have found that HLA-B39 was most strikingly associated with spondylitic and/or sacroiliitic lesions. It is remarkable that all B39 positive patients presented with axial involvement; none had peripheral arthropathy alone. These findings suggest that B39 is a strong indicator for axial involvement in PsA; it may discriminate a genetically distinct group of patients particularly prone to develop axial arthropathy.

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Hair Root Studies in Patients Suffering from Primary and Secondary Syphilis

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The hair root status (trichogram) was studied in eleven patients with primary and eight with secondary syphilis. Variables studied in addition to the hair roots were absence or presence of hair root sheaths, deformities and hair roots with angulations exceeding 20°. A decrease in the number of anagen hair roots and an increase in the number of catagen hair roots, dysplastic/dystrophic roots and anagen hair roots with sheaths and more than 20° angulation was observed in both groups of patients. No difference was demonstrable

between the findings in primary and those in secondary syphilis. Whether the abnormalities found in the trichogram are specific of syphilis, is unknown. *Key words: Alopecia; Trichogram.* (Received August 26, 1986.)

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Within a few hours of infection syphilis is already to be regarded as a systemic infection which progresses in several stages. The literature makes no mention of hair loss in primary syphilis except in the case of localization of the primary lesion on the scalp (1).

As an expression of the bacteraemia present in secondary syphilis, hair loss as well as skin lesions and general symptoms may be observed. There are two known types of hair loss in this stage: "moth-eaten" alopecia and diffuse alopecia. Not only the scalp but all hairy parts of the skin may be affected. Hair growth resumes spontaneously after a few weeks. Three to five months after the primary infection there may be diffuse loss of scalp hair, clinically not different from the alopecia observed in febrile infection diseases.

A rare phenomenon is the increase in hair loss in secondary syphilis as a symptom of a febrile Jarisch-Herxheimer reaction, a few hours after starting an anti-syphilitic penicillin course (2). The hair roots may react to many different noxae, e.g. toxic, infectious, iatrogenic, traumatic, etc.

Syphilitic infections are suitable *par excellence* as a model to be used in studies of the effect of an infectious agent on the hair root. The aim of the present study is to obtain information on the behaviour of hair roots in infectious syphilis, compared with hair roots from healthy subjects.

PATIENTS AND METHODS

The study comprised 11 patients (4 women and 7 men, age range 17–44 years) with primary syphilis and 8 patients (3 women and 5 men, age range 18–48 years) with secondary syphilis. The patients fulfilled the following criteria: proven untreated syphilis, no pregnancy, no history of hair loss, no medication and no other diseases. Syphilis was diagnosed on the basis of clinical findings, a positive dark field and/or positive serological syphilis tests. None of the primary syphilis patients complained of hair loss. One patient with primary syphilis was sero-negative (no. 11).

Of the secondary syphilis one patient (no. 6) showed moth-eaten alopecia; the others had no complaints about hair loss. The hair roots were obtained two to six days after the last washing. On the sample site ±50 hairs were cut down to about 0.5 cm above the scalp surface. Then the epilation forceps is placed as close to the skin of the scalp as possible and 4–7 hair roots simultaneously are extracted with a fast pull up to a total of 50 hair roots (3). The hair roots were epilated at two sites (left temporal and cranial scalp region) and fixated on a slide in a collecting medium that consists of knock-resistant polystyrene (pH 7), which assumes the hardness of glass within a few hours (Depex®, Brunschwig Chemie, Amsterdam). The hair roots were examined at 40-fold magnification.

The characterization of hair roots is as follows: Anagen hair roots are triangle or parallel shaped. Root sheaths are usually present and firm, and angulations and deformities of root and/or shaft may occur in a small percentage of hair. Catagen hair roots are parallel or open shaped. The root sheaths are loose or firm. There are no angulations and the contours of root and/or shaft are nearly always smooth. Telogen hair roots are club-shaped, and mostly surrounded by an epithelial sac. No angulations are seen and the contours of root and/or shaft are smooth. Dysplastic/dystrophic hairs are open or closed shaped. The root sheaths are always absent.

The normal values of the hair root status were obtained from ten healthy males and ten healthy females (age range 20–45 years) (3) and agreed with those in a previous study (4). In this group the epilation took place four days after the last washing. Special attention was paid to presence or absence of hair root sheaths, deformities and hair roots with more than 20° angulation, because there is a correlation between absence of hair root sheaths and >20° angulation and contour deformities. Angulation of the hair root can be found at any level, but is usually seen at the level of the bulb or the keratogenous zone. The liminal value accepted in our study is 20°. The deformities of the hair roots

consisted of invaginations, evaginations, indentations and or constrictions. The trichograms were made by the same person.

In the statistical analysis we compared, by means of *t*-tests, our sample means with the sample means observed in the above mentioned sample of 20 persons. As no standard deviations were available for the latter group, we supposed that our standard deviations also apply to the normal group, in order to keep our conclusions on the conservative side.

RESULTS

Both the primary and the secondary syphilis patients showed a statistically significant decrease in the number of anagen hair roots and a statistically significant increase in the number of catagen hair roots, both on the cranial and on the left temporal region of the scalp. In both groups the number of telogen hair roots showed no statistically significant increase or decrease. The number of dysplastic/dystrophic hair roots showed a statistically significant increase at both sites in the primary syphilis group; the secondary syphilis group showed this increase only at the cranial site (Tables I and II). As assessment of the hair roots, deformities and angulations exceeding 20°, both groups showed an identical distribution of the various hair root types at both sites.

A striking finding was the statistically significant increase in the number of anagen hair roots with sheaths and with more than 20° angulation (normal value 1%) in both groups at both sites. The following values (mean and standard error of the mean) were obtained: Primary syphilis: cranial region 7%±1.9% (p=0.01), left temporal region 9%±7% (p=0.009). Secondary syphilis: cranial region 9%±4% (p=0.01), left temporal region 10%±2.8% (p=0.02).

DISCUSSION

Even in the first descriptions of the syphilitic infection hair loss was mentioned as a conspicuous symptom in syphilis patients. Little is known about the pathogenesis of this

Table I. *Hair root status (%) in patients with primary syphilis, giving total mean values, normal values (n=20 patients), standard deviation and two-sided p-values of t-tests*

Patient number	Anagen		Catagen		Telogen		Dysplastic/dystrophic	
	Cran.	L. temp.	Cran.	L. temp.	Cran.	L. temp.	Cran.	L. temp.
1	28	30	16	12	40	28	16	30
2	82	74	4	8	14	4	0	14
3	38	52	6	16	50	22	6	10
4	26	42	18	19	26	30	30	9
5	18	32	0	4	54	30	28	34
6	94	82	2	4	2	2	2	12
7	46	20	22	18	16	8	16	54
8	42	78	33	10	8	12	17	0
9	38	34	8	4	10	12	44	50
10	54	64	8	14	28	10	10	12
11	–	54	–	10	–	24	–	12
Mean values	47	52	11	10	25	17	17	21
Normal mean values	80	80	2	2	15	15	3	3
SD	24.0	20.9	10.1	6.0	18.0	10.9	13.9	17.9
p-values	0.001	0.001	0.03	0.001	0.2	0.6	0.01	0.01

hair loss, but the correlation between hair loss and acute febrile infectious diseases has long been known.

Zaun (5) distinguished between acute febrile infectious diseases. He explained the hair loss in acute febrile infectious diseases as a result of direct transition from catagen to telogen phase. A telogen effluvium occurs after 2–3 months. In our study we found no telogen effluvium but we did observe a statistically significant decrease in the number of anagen hair roots and a statistically significant increase in the number of catagen hair roots in the cranial and the left temporal scalp region. To our surprise there were no differences in findings between primary and secondary syphilis.

The hair wash procedure was different in the control group and the patient group. Although hair washing can cause a significant increase in the number of dysplastic hair roots and a significant decrease in the number of telogen hair roots, it has no influence on the number of catagen hair roots (6). Detailed examination of the hair roots revealed an identical pattern in primary and secondary syphilis. Unlike Peereboom-Wynia (3), we found a statistically significant increase in the number of anagen hair roots with hair root sheaths with more than 20° angulation at both sites (cranial and left temporal region) both in primary and in secondary syphilis. Why abnormal angulation should be seen precisely in anagen hair roots of this type, is unknown. The standardized epilating technique could not be the cause of the angulations and deformities found. Whether the abnormalities found in the trichogram are specific of syphilis is unknown. We conclude from our findings that the mechanism underlying the above-mentioned shifts in hair root status is the same in primary and in secondary syphilis, and probably based on a circulatory disturbance caused by the perivascular inflammatory infiltrate of the hair follicles (7). Particularly the anagen hair roots with their high metabolic and mitotic activity are very susceptible to noxious influences. The circulatory disturbance shortens the anagen phase and accelerates the transition from catagen to the telogen phase. The appearance of focally sclerotic collagen bundles around the hair follicles (7) could be a possible explanation of the angulations found in the anagen hair roots.

It seems plausible that the anagen hair root reacts to noxious influences in a stereotyped way. The time of examination and severity, location and duration of the influence of the

Table II. *Hair root status (%) in patients with secondary syphilis, giving total mean values, normal values (n=20 patients), standard deviation and two-sided p-values of t-tests*

Patient number	Anagen		Catagen		Telogen		Dysplastic/dystrophic	
	Cran.	L. temp.	Cran.	L. temp.	Cran.	L. temp.	Cran.	L. temp.
1	42	32	28	18	22	40	8	10
2	54	60	14	18	14	20	18	2
3	35	29	6	10	8	7	51	54
4	70	78	10	8	12	8	8	6
5	18	35	8	11	40	16	34	38
6	–	20	–	18	–	52	–	10
7	36	39	18	29	22	24	24	8
8	72	76	14	16	10	6	4	2
Mean values	47	46	14	16	18	22	21	16
Normal mean values	80	80	2	2	15	15	3	3
SD	20.1	22.1	6.9	7.1	11.1	17.0	16.9	19.0
p-values	0.001	0.001	0.0005	0.00007	0.5	0.3	0.02	0.1

causative agent probably determine the abnormalities found. Histologic and immunologic studies are necessary to explain the clinical differences between primary and secondary syphilis.

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Basal Keratinocyte Herniation

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Kanerva L. Basal keratinocyte herniation. Acta Derm Venereol (Stockh) 1987; 67: 254–257.

Basal cell herniations, i.e. basal keratinocyte processes protruding through basal lamina gaps were observed in psoriasis, circinate balanitis, pityriasis rubra pilaris, patch tests, gold dermatitis and conjunctivitis. This indicates that they are not specific to psoriasis and tumours as has been reported. *Key words: Electron microscopy; Allergic and irritant patch tests; Pityriasis rubra pilaris; Psoriasis; Circinate balanitis; Gold dermatitis; Conjunctivitis.* (Received October 20, 1986.)

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Basal keratinocyte processes protruding through basal lamina gaps have been found in psoriasis (1–3) in Darier's disease (4), and in epithelial tumours (5–9). According to Heng & Kloss (4) these basal cell herniations have not been described in other dermatitides. The purpose of the present report is to give further examples of basal cell herniation.

MATERIAL AND METHODS

Electron microscopy of a variety of skin diseases has been performed by the present author since 1979. For ultrahistopathology, 1 mm^3 or smaller blocks have been fixed in cacodylate- or phosphate-

Fig. 1. Pityriasis rubra pilaris. Basal cell process (asterisk) is seen to protrude through the basal lamina (between arrowheads). The distal part of the process is in close contact with a dermal cell (dc). *tf*, tonofilaments; *mf*, microfibrils. ×16600.

Fig. 2. Eczematous gold dermatitis reaction. Basal keratinocyte herniation (asterisk) through basal lamina (between arrowheads). Oedema □ and granular substance (inside ring beyond and below dermo-epidermal junction) is often observed in eczematous reactions. *D*, dermis; *E*, epidermis; →, microtubule. ×20000.