

tained. Another problem is the antimycotic activity of the solvent (1, 2, 3). DMF has a rather low activity in comparison with ethanol, isopropyl alcohol, and acetone for example (1). Therefore, to obtain a reliable MIC of antimycotics with low water solubility several factors must be taken into account. The antimycotic should preferably be dissolved in a solvent with low antimycotic activity and then diluted with water to the highest concentration of the antimycotic where the solution still remains clear (1). The agar tubes or agar plates should be made up with freshly prepared and clear stock solutions. When a liquid medium is used there may be a risk of precipitation of the antimycotic on the inside of the tube. Even if the concentration of antimycotic is low the time of incubation is several days, and therefore a solid medium is preferable.

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Serum IgE Antibodies to Scabies Mite

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Abstract. Sixteen patients with scabies were examined. Eight (50%) of them had elevated serum total IgE levels. The highest level, 10 000 U/ml, occurred in a patient with Norwegian scabies. IgE antibodies specific to scabies mite were found in two of the five patient sera examined. Thus, it seems probable that an IgE-mediated reaction plays a role in the manifestations of scabies in man.

Key words: Scabies; IgE antibodies; RAST

There is evidence to suggest that immune mechanisms are activated in the course of human and animal scabies infection. Clinical symptoms appear about one month after primary infestation by scabies mite (*Sarcoptes scabiei*) but in reinfection pruritus and papulovesicles appear within 24 hours and the size of the mite population remains much lower (11, 13). Recent studies on scabies have shown IgE deposits in the dermal vessels of a scabious lesion, high levels of serum total IgE and frequent occurrence of IgE antibodies to house-dust mite (5, 6, 8), all suggesting that an IgE-mediated mechanism is involved.

The present study shows that IgE antibodies to scabies mite can be detected in the sera of patients with scabies by using the radioallergosorbent test (RAST).

PATIENTS AND METHODS

Patients

Sixteen patients with scabies, 13 males and 3 females, aged from 10 to 53 years were examined. At the time of examination the pruritus and rash had varied in duration from 1 to 6 months (mean 2½ months). Eleven of the patients had widespread scabies and one had the clinical picture of Norwegian scabies preceded by a 2-month treatment period with peroral (triamcinolone 4 mg/day) and topical steroids. One of the patients had previously been infected with scabies and one patient had a history of atopic dermatitis.

Scabies mite antigen

Human and pig scabies (*Sarcoptes scabiei* var. *suis*) mites are varieties of the same species (4). To obtain sufficient antigen for the present examinations the mites were collected from the ears of naturally infected pigs using the method of Sheahan (13). About 1 000 living mites including adults and nymphs were harvested with a needle after transfer to Petri dishes. Efforts were made to avoid contamination by epidermal debris. The mites were ground and suspended in 0.5 ml of 0.9% sodium chloride. The protein content of the solution was 176 µg/ml. The solution was stored at -20°C until use in the RAST.

RAST

The proteins in the scabies mite extract were coupled to Munktell filter paper discs (Grycksbo Pappersbruk, Sweden) activated with cyanogen bromide using a 70 µl extract per disc as described by Ceska & Lundkvist (3). These discs and the Phadebas RAST (Pharmacia Diagnostics, Sweden) reagents, including house-dust mite (*Dermatophagoides pteronyssinus*) discs, were used to determine IgE antibodies to scabies and house-dust mites. The specific serum IgE concentrations were given in both Phadebas RAST units per ml (PRU/ml) and in RAST scores as described by Lundkvist (10). For the present purpose arbitrarily defined results of 0.30 PRU/ml or

Table 1. Serum total IgE and IgE specific to scabies and house-dust mites in 16 patients with scabies

nd=not done

Patients	Age (years)	Total IgE (U/ml)	Specific IgE			
			Scabies mite		House-dust mite	
			(PRU/ml)	(RAST score)	(PRU/ml)	(RAST score)
K. A.	23	37	nd	nd	<0.35	0
L. A.	44	7	nd	nd	<0.35	0
T. A.	10	2 700	0.66	1	<0.35	0
J. E.	23	250	<0.35	0	<0.35	0
E. G.	31	330	nd	nd	0.36	1
R. G.	40	34	nd	nd	<0.35	0
A. H.	38	12	<0.35	0	<0.35	0
E. K.	53	230	0.42	1	<0.35	0
E. L.	29	90	<0.35	0	2.10	2
H. L.	29	10 000	nd	nd	nd	nd
T. L.	34	250	nd	nd	<0.35	0
P. M.	24	23	nd	nd	<0.35	0
S. M.	13	49	nd	nd	<0.35	0
E. R.	26	320	nd	nd	<0.35	0
O. T.	30	180	nd	nd	<0.35	0
J. V.	23	83	nd	nd	<0.35	0
Control SK	12	820	<0.35	0	5.50	3

higher were considered positive. The traditional RAST score of 1 equals 0.30-0.70 PRU/ml. Serum IgE antibodies to scabies mite were determined in only five patient sera and one control serum due to the small amount of scabies mite antigen available.

Serum total IgE

IgE levels were determined using the Phadebas IgE PRIST test (Pharmacia Diagnostics, Sweden). The upper limits chosen for the reference (normal) range were the same as those employed in a similar Norwegian study (5). These were 122 U/ml for adults and 195 U/ml for children.

RESULTS

Total IgE levels were above the reference range in 8 (50%) of the patients (Table 1). The highest level, 10 000 U/ml, was found in the patient with Norwegian scabies, and the second highest in a young boy with widespread but otherwise 'normal' scabies.

IgE antibodies to scabies mite at a level 0.30 PRU/ml were found in two of the five patient sera examined. Both these sera showed elevated total IgE levels (Table 1). IgE antibodies to house-dust mite were detected in two of the 15 sera examined (Table 1). One of these 2 patients was the only one in the present series with a history of atopy. Five patient sera and one control serum were tested for both scabies and house-dust mite IgE antibodies; no

simultaneous occurrence of these antibodies was detected (Table 1).

DISCUSSION

Elevated serum total IgE levels were found in half of the present patients with scabies. In agreement with this, Falk & Bolle (6) observed raised levels in 45% of their patients compared with 4% of controls. On the other hand, earlier investigators have reported normal IgE levels in scabies (1, 9). In the present study the highest IgE level, 10 000 U/ml, was found in a patient with Norwegian scabies. This kind of scabies is characterized by widespread crusted lesions with very high numbers of mites; it usually occurs in immunodeficient or immunosuppressed patients (2). Before the diagnosis was established, our otherwise healthy patient had been treated for 2 months with steroids, which may have caused the development of this rare form of scabies. The strong antigenic stimulus could, in turn, have caused the high IgE level but, unfortunately, we were not able to examine the patient for IgE antibodies specific to scabies mite. IgE levels over 1000 U/ml have previously been observed in scabies, but it is not known whether the patients had Norwegian scabies (5, 6). However, these very high IgE levels observed in scabies, i.e. in an ec-

toparasite infection, suggest a humoral IgE response similar to that in many helminthic infections (12).

In the present study IgE antibodies specific to scabies mite were found in the sera of 2 of the five patients examined, which gives further support to the involvement of an IgE-mediated reaction in scabies. Previously, positive intracutaneous skin test and Prausnitz-Küstner test reactions have been observed when using scabies mite antigen of human origin (7). The same authors reported a close correlation between skin test reactions to scabies and house-dust mites in 35% of their patients. IgE antibodies to scabies mite were not examined with RAST in that study (7) but it was suggested that the scabies mite and house-dust mite antigens may cross-react. The present results, obtained with a smaller number of patients, do not support this view. The patients with IgE antibodies to scabies mite did not have antibodies to house-dust mite and, on the other hand, the patient and the control with IgE antibodies to house-dust mite did not show antibodies to scabies mite.

To sum up: we used the RAST to demonstrate the presence of IgE antibodies to scabies mite in patients with scabies. The present and previous results suggest that an IgE-mediated reaction plays a role in the manifestation of scabies in man.

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Infestation of Scabies in the Scalp Area

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Abstract. A 25-year-old female patient with seborrheic dermatitis of the scalp developed a scabies infestation located chiefly in the scalp area. It is suggested that the treatment of the seborrheic dermatitis of the scalp with a local corticosteroid (hydrocortisone-17- α -butyrate) is the probable explanation for the atypical location of the scabies infestation in this patient.

The 'election of sites' of the scabies parasite on the human body is characteristic of the scabies disease (7). This localization to specific areas of the body is thus a valuable aid in the diagnosis of the disease. However, atypical location is sometimes observed (2, 7), though hitherto there have been no reports describing the localization of scabies parasites in the scalp area among adult patients. For instance, Orkin reported no cases with this location among 886 investigated patients with scabies disease (7). We therefore consider it a matter of interest to report on an adult patient with scabies parasites located chiefly in the scalp area.

CASE REPORT

A 25-year-old female patient visited our dermatology department because of increasing pruritus in the scalp. For 5 years the patient had noted slight symptoms from