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Contact Urticaria in Laboratory Technicians Working with Animals

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The occurrence of contact urticaria was studied in 101 laboratory technicians investigated for allergy to laboratory animals. Fourteen cases of contact urticaria caused by rat were found. Other animals causing contact urticarial reactions were mouse (7), guinea-pig (4), and cat (2). Hand eczema was not found in laboratory technicians with contact urticaria and IgE-antibodies to laboratory animals. *Key words: Laboratory animals; Rat; Mouse; Guinea-pig; Cat; IgE-antibodies; Late cutaneous reaction; Hand eczema.* (Received September 26, 1984.)

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People allergic to animals can develop itching and wealing at skin sites on contact with the relevant animal. Such contact urticaria seldom brings a patient to a dermatologist because the cause is evident. In a recent study on laboratory technicians working at the laboratories at Lund University many cases of allergy were diagnosed. It was therefore decided to evaluate the occurrence of contact urticaria and other skin manifestations in this well-defined population.

MATERIAL AND METHODS

All 101 laboratory technicians (97 women and 4 men) working with laboratory animals and employed at 25 research laboratories at the University of Lund were included. A questionnaire was designed to disclose symptoms of allergy to 6 species of laboratory animals, namely: rat, mouse, guinea-pig, cat, rabbit, and hamster. 83 technicians were working with rats, 55 with mice, 55 with rabbits, 35 with guinea-pigs, and 26 with cats. The following symptoms were enquired about: rhinitis, conjunctivitis, asthma, and urticaria related to animal work. Questions concerning history of atopic symptoms in childhood were included. 39 women and 2 men reported animal-related symptoms, and were examined at the Department of Occupational Medicine. A history with special attention to routines in animal handling was taken. Skin symptoms elicited by contact with laboratory animals were specially asked about. Information on skin sites giving most symptoms was generally volunteered at the interview. Prophylactic measures tried were thoroughly discussed. Skin prick tests were performed on the volar aspect of the forearm, and included the following animal allergens: urine extracts from rat and mouse, and hair and skin extracts from guinea-pig, hamster, cat, and rabbit. The rat and mouse antigens are low molecular weight urinary proteins, mainly an alpha-2-globulin in rat urine and a prealbumin in mouse urine (1, 2). These were separated from concentrated urine by gel filtration on a Sephadex G 100 column. The cat extract also included a saliva preparation, because it has been suggested that cat saliva contains a potent allergen (3). The tests also included a standard battery of common environmental allergens (4 pollen extracts, 4 moulds, 2 mite species, and allergens from dog and horse). The laboratory animal allergens were prepared by the Occupational Allergy Unit, Sahlgren's Hospital, Gothenburg, and the standard battery allergens by Pharmacia Diagnostics AB, Uppsala and the Allergological Laboratory, Copenhagen.

Histamine hydrochloride (10 mg/ml) was used as reference for prick tests, and the weal size was defined as +++. Skin reactions to the allergens were compared with the histamine weal area, and were classified as follows: 0 = No reaction or less than 1/4 of the histamine weal size, + = 1/4 of

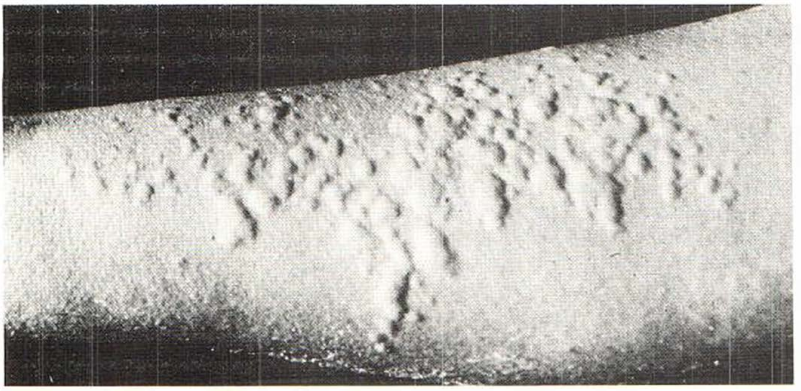

Fig. 1. Intensity of contact urticaria in a laboratory technician allergic to rat and working without protective clothing.

histamine weal, ++ = 1/2 of the histamine weal, +++ = histamine weal, ++++ = 2 × histamine weal, and +++++ = 4 × histamine weal.

Specific serum-IgE antibodies to the animal allergens were measured with radioallergosorbent tests (RAST). Bromocyanide-activated cellulose disks were coupled with guinea-pig, rat, and mouse allergens using standard procedures at the Occupational Allergy Unit, Gothenburg. Rabbit, cat, and hamster disks and radioactive IgE tracers were purchased from Pharmacia AB, Uppsala. The respiratory symptoms were investigated as described elsewhere (Agrup G, Belin L, Sjöstedt L, and Skerfving S. Allergy to laboratory animals in laboratory technicians. Manuscript in preparation).

From the detailed history it emerged that the symptoms were probably related to exposure to animal handling in 30 people, and a further 11 had other work-related symptoms. Among the 30 technicians (29 women and 1 man) with symptoms of laboratory animal allergy 19 (18 women and 1 man) showed positive test results to 1 or more animal allergen, and 11 showed negative animal tests. The number of positive animal test results were 15 to rat, 10, to mouse, 6 to rabbit, 9 to guinea-pig and hamster, and 8 to cat.

Technicians with hand eczema were specially questioned about intolerance to laboratory animals even though they had not reported such intolerance in the questionnaire. Skin prick tests with animal allergens and RAST were performed as described above, and these people were also subjected to epicutaneous tests with standard allergens recommended by ICDRG and possible eczematogens suggested by the history.

RESULTS

The history revealed symptoms of urticaria in 14 laboratory technicians after contact with rat, 10 said that contact with the animal's tail was enough to elicit urticaria on skin of the hands and forearms, and this they considered normal (Fig. 1). In 3 technicians wealing occurred only after being scratched by a rat. Seven technicians with urticaria caused by contact with rat also reported itching and redness after contact with mouse, but in these cases the history of wealing was less convincing. Mouse urine, however, usually gave rise to wealing on normal skin. Four technicians reported itching and redness after contact with guinea-pig. None reported skin symptoms after contact with rabbit or hamster. Two developed urticaria after being licked by cat, but contact with fur only did not provoke skin symptoms.

Any urticaria always appeared within minutes of contact with the offending animal. Generalized urticaria was never reported, but wealing was limited to the area of contact with the animal and in one case also affected the adjacent skin. All people showing local urticaria also reported respiratory tract symptoms when handling the animals. None of the laboratory technicians with immediate skin reactions induced by animal contact had eczematous dermatitis. Of the 14 technicians with urticaria caused by contact with rat 13

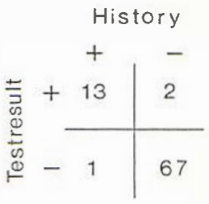

Fig. 2. Rat allergy among 83 subjects working with rats. History of contact urticaria in relation to results of testing.

had positive prick tests to rat allergen and also positive RAST. One, however, had negative prick test and RAST although the history was convincing. All 7 technicians with urticaria associated with mouse had positive prick tests and RAST-reactions, and the 4 with skin symptoms caused by guinea-pig also showed positive animal test reactions like the 2 with cat lick urticaria.

One technician had an immediate skin reaction +++++ to mouse, ++++ to rat, +++ to hamster, and ++ to guinea-pig. The weals disappeared within 1 h, but after 6 h cutaneous infiltrations appeared at the sites of the previous reactions to mouse, rat, and hamster. The infiltrates were much larger than the original weals, and persisted for 24–30 h. Slight itching accompanied the late reactions.

Histological examination of an infiltrate showed swelling of capillary endothelium with neutrophils and eosinophils invading the vessel walls. Direct immunofluorescence showed no IgG, IgA, IgM, or C_3. There were no precipating antibodies to the relevant allergens in the serum.

Four of the 101 technicians reported hand eczema. One had bronchial asthma not with certainty related to animal handling, and this woman showed negative test reactions to laboratory animal allergens. She had a chronic desquamating dermatitis, but gave a previous history of vesicular eruptions. Patch testing with standard allergens and with occupational contact allergens resulted in a positive reaction to diaminodiphenylmethane. This positive patch test could have reflected earlier use of rubber gloves.

The 3 other technicians with hand eczema had no respiratory symptoms and no history of contact urticaria. All tests to laboratory animal allergens were negative. Patch testing showed allergy to nickel in 1 case, but all other reactions were negative. In all 3 the dermatitis was slight, and was consistent with contact dermatitis in 2 cases and with nummular eczema in 1.

All technicians with urticaria developing on contact with animals had taken measures to avoid such contact by wearing long sleeves and gloves while handling animals. Such prophylactic measures were as a rule highly effective.

DISCUSSION

The present study has demonstrated marked prevalence of allergic contact urticaria in technicians working with laboratory animals. The animal most commonly causing contact urticaria was rat, and contact with the tail in particular resulted in wealing. In most cases the weals appeared on apparently normal skin, and itching sometimes developed within 1 minute of touching the tail. In some cases weals did not develop on normal-looking skin after contact, but appeared only after a scratch, which often happens when working with rats. The laboratories were inspected in same cases, and close agreement between the history and the symptoms and signs were confirmed. The protective measures were also studied at the same time, and were found to be effective.

A history of skin symptoms appearing during work with rats proved to be highly

predictive with regard to the test results: 13 of the 14 technicians with contact urticaria had positive prick tests and RAST to rat allergens. In the entire series 15 technicians had positive test reactions to rat allergen and 13 of them gave a history of contact urticaria (Fig. 2).

Fewer technicians showed pronounced urticaria after contact with mouse than with rat, but many reported itching. Mouse urine was effective in eliciting symptoms, and in mouse too there was close correlation between history and test results. Guinea-pig caused contact urticaria in half of the technicians who were allergic to this specie. No contact urticaria caused by rabbit was found, although 6 positive test reactions were seen. Of the 8 technicians with positive cat tests 2 reported urticarial reaction to cat. Cat saliva seemed to be particularly liable to provoke contact urticaria, because cat lick was conditional in eliciting symptoms in the two cases reported.

Contact urticaria (4) can be induced by allergic or non-allergic mechanisms, and the many aetiological agents have recently been reviewed (5, 6). Contact urticaria caused by laboratory animals has been mentioned briefly (7–13). Newman Taylor (13) found 5 cases of contact urticaria with no other allergic manifestations. In the present study, however, all technicians with contact urticaria also had respiratory symptoms. None of the technicians with positive test reactions to laboratory animals reported hand eczema. None of the 4 technicians with hand eczema had specific IgE antibodies; 3 of them did not relate their symptoms to contact with animals, and 1 said her eczema became worse when working with guinea-pigs.

On the basis of a prevalence study in the general population (14) 4 cases of hand eczema may be expected in this population of laboratory technicians. Work with laboratory animals does not therefore seem to cause eczema.

In 1 person prick testing with animal allergens induced not only strong immediate weal reponses but also late reactions much larger than the original weals. Such late reactions are well-known after strong immediate reactions to intracutaneous tests, but are apparently rare after prick testing. Late cutaneous reponses have been discussed and experimentally investigated (15, 16). Like other researchers, we have found no evidence of mediation of late reactions by antibodies other than IgE.

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