

Brief communications

Delayed hypersensitivity to pollen skin prick tests and seasonal rhinitis

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Skin testing for identifying allergen-specific IgE may sometimes give rise to late reactions. There has been considerable research demonstrating the inflammatory component to late-phase responses.¹ Accordingly, treatment approaches to atopic disorders now involve an expanded use of antiinflammatory agents. In this report, a patient with seasonal rhinoconjunctivitis showed isolated late reactions to pollen skin tests, which peaked at 24 to 48 hours after testing, a pattern consistent with delayed-type hypersensitivity (DTH). The associated clinical findings are described and discussed.

CASE REPORT

A 43-year-old Chinese man presented with seasonal ocular itching accompanied by frequent sneezing of 3 years' duration. Symptoms started in April and ended by July. He had been told that he had negative allergy skin test results by another allergist but noted painful swelling of some sites on the day after testing. Antihistamines and nasal corticosteroids provided little relief, but ocular steroids helped reduce pruritus. The patient had immigrated from Taiwan 14 years earlier and had no history of prior medical conditions, family atopy, drug abuse, or occupational allergen exposure.

Results of the physical examination were normal except for erythema of the conjunctiva and some erythema and secretions in the nasal mucosa. A nasal scraping revealed multiple clumps of goblet cells, which constituted more than 50% of nonepithelial cells. There were some granulocytes but less than 1% eosinophils.

Skin prick tests were performed on the forearm with commercially obtained glycerinated extracts (Center Laboratories, Port Washington, N.Y.): (1) mixed common/giant ragweed pollen 1/20 wt/vol, (2) a mold mixture (*Alternaria*, *Cladosporium*, *Penicillium*, and *Aspergillus* species 1/10 wt/vol), (3) *Dermatophagoides farinae* (DF) 10,000 allergenic units/ml, (4) mixed weed pollen

Abbreviations used

DF: *Dermatophagoides farinae*
DTH: Delayed-type hypersensitivity

(lamb's-quarter, cocklebur, English plantain, and rough marsh elder 1/20 wt/vol), (5) mixed grass pollen (timothy, orchard, red top, sweet vernal, and June 1/20 wt/vol), and (6) mixed tree pollen (ash, beech, birch, elm, hickory, oak, maple, and poplar 1/20 wt/vol). Histamine 2.75 mg/ml produced a 5 mm diameter wheal, whereas the other test sites had no wheals within a 20-minute observation period. Induration sizes over a 6-day period were then recorded (mean of orthogonal measurements). Only pollens showed subsequent reactions (Fig. 1). Allergen-specific IgE (Pharmacia CAP System; Pharmacia, Uppsala, Sweden) to beech, oak, elm, DF, short ragweed, giant ragweed, English plantain, lambs quarter, *Alternaria tenuis*, orchard-cocksfoot, timothy, maple, and birch were all modified RAST class 0; and total IgE (Ciba-Corning ACS IgE; Ciba Corning Diagnostics Corp., Medfield, Mass.) was less than 1 unit/ml.

One week later, the patient had repeat testing performed with the same extracts on the opposite forearm. The delayed reactions are shown in Fig. 1. A repeat nasal scraping showed the same cytologic pattern and allergen-specific serum IgG levels (Hycor Biomedical, Irvine, Calif.) to DF, orchard, timothy, common ragweed, and giant ragweed were 152, 176, 62, 27, and 90 ng/ml, respectively.

DISCUSSION

DTH is a marker of cellular immunity. Studies of murine T-helper lymphocyte immunoregulation of the allergic process suggest that two subpopulations, T_{H1} and T_{H2} cells, have opposing influences.² T_{H1} cells are involved with DTH and γ -interferon production, which suppresses IgE responses, whereas T_{H2} cells promote IgE and eosinophil responses through interleukin-4 and interleukin-5 secretion. The patient described appears to have features consistent with a T_{H1} pattern, with DTH, no IgE responses, and a noneosinophilic nasal cytologic pattern. Although the mechanism for his undetectable IgE level is not clear, it is intriguing

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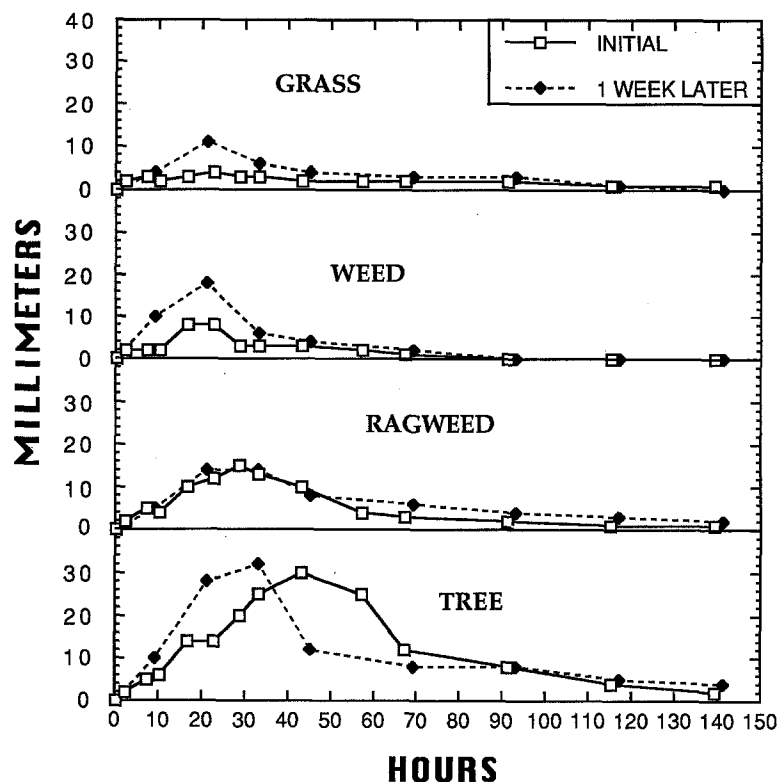


FIG. 1. Delayed skin test responses to various pollens plotted over time. Measurements represent the mean of orthogonal measurements in millimeters.

to consider the possibilities that IgE deficiency may either promote or be the result of a T_{H1} -predominant pattern.

Several features argue against this patient having late-phase skin test responses. First, late-phase responses are IgE-dependent, and this patient had no demonstrable IgE.¹ Second, a larger maximum induration (weed/grass) or earlier peak responses (ragweed/tree) on repeat testing were seen with all reactive extracts, suggesting a booster response. Booster responses have occurred with DTH reactions to tuberculin.³ Third, the timing of peak reactions was more consistent with DTH reactions.⁴

It is clear that this patient has immunity to aeroallergens as demonstrated by the presence of detectable allergen-specific IgG, implying that T-helper cells are present to facilitate humoral responses. However, with *DF*, no delayed skin test response developed, despite a significant level of IgG. This pattern implies that different T-helper lymphocyte populations may be involved for different aeroallergens or that allergen-antigen processing at different sites may be different. This patient's IgG humoral response to aeroallergens presumably involved the respiratory tract.⁵ Be-

cause the patient's symptoms are seasonal rather than perennial (which one might expect if *DF* were involved), it would appear more likely that DTH-rather than IgG-related interactions relate to the patient's disease. I hope that this report will alert others of this potential consequence of allergy skin testing and that DTH responses to aeroallergens will be examined in the future for an association with/or mechanism relating to respiratory tract disease.

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