

# Is There a Need for Repetition of Skin Test in Childhood Allergic Diseases? Repetition of Skin Test and Allergic Diseases

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## ABSTRACT

**Background:** Skin prick tests are widely used to determine sensitivity in allergic diseases. There is limited information about the natural history of skin sensitization tests and factors that affect them. It was aimed to determine the changes in skin test results and the factors affecting the reactivity of skin tests after a period of approximately four years in children with allergic disease.

**Methods:** SPT of 170 patients among 2485 children with asthma and/or allergic rhinitis and/or atopic dermatitis, who underwent SPT between 2005 and 2007, were repeated after an interval of at least 3 years.

**Results:** The mean age was  $10.7 \pm 3.1$  (5-18) years and 70% of the patients were male. In total 66 (39.0% of the study population) had a different skin tests result in follow-up. Alterations: loss of sensitivity in 18 (11%) patients, the formation of a new sensitivity in 37 (22%) patients, and 11 (6%) both gained and lost sensitization. The presence of atopy in the family, the presence of allergic rhinitis and IgE elevation significantly predicted the incidence of new sensitization. The presence of sensitization to multiple allergens significantly predicted the incidence of loss of sensitization.

**Conclusions:** It is found that there was an alteration of sensitization in 4/10 children at the end of the average 4-year period. The presence of family atopy, the presence of allergic rhinitis and serum total IgE elevation were risk factors for the development of new sensitization. On the other hand sensitization to multiple allergens was risk factors for the loss of sensitization.

## KEY WORDS

allergen, allergic asthma, house dust mites, seasonal allergic rhinitis, skin prick test

## INTRODUCTION

Skin prick test (SPT) is commonly used to investigate type 1 hypersensitivity to a specific allergen. Skin prick test is a method that is simple, easy, comfortable, inexpensive, safe, rapid and can be applied at any age. It is recommended as the allergological "test of choice" in clinical practice and clinical-epidemiological research.<sup>1,2</sup> Response to histamine and allergens are affected by various factors such as time, immunotherapy and certain drugs. New sensitizations and the natural course of sensitization might

be understood by repeated SPT. Various studies have been carried out to assess the natural course of sensitization in children and adults. In these studies, factors affecting SPT response were determined according to time, gender, exposure to tobacco smoke in childhood, high IgE levels, the presence of new allergic symptoms, family history of atopy, having siblings, having ever had one or more cats at home, rural living, having ever lived on a farm, and heavy traffic road within 200 m distance.<sup>3-12</sup>

It was aimed to determine the changes in SPT results and factors affecting the reactivity of skin tests

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after a period of approximately 4 years in children with allergic disease.

## METHODS

SPT of 170 patients among 2485 children with asthma and/or allergic rhinitis and/or atopic dermatitis, who had undergone SPT between January 1, 2005 and December 31, 2007 in the Clinic of Pediatric Allergy and Immunology, were prospectively repeated after an interval of at least 3 years. The exclusion criteria were: 1. patients aged over 18 years, 2. intake of drugs that could affect the SPT result (antihistamines, corticosteroids, etc.), 3. the presence of extensive skin lesions, 4. currently taking or have taken allergen immunotherapy, 5. severe cardiovascular disease, 6. taking beta-blockers and 7. Those who patients didn't have written informed consent. The study was approved by the local ethics committee. Informed consent was obtained from all subjects and/or their parents.

## PROTOCOL

A questionnaire was completed for all subjects. Details regarding patient demographics and medical history were recorded in the questionnaire. "Atopy" with SPT was defined as a positive reaction to any one of the allergens. Familial atopy was defined as being positive when having allergic disease in first degree relatives. The diagnosis of allergic rhinitis and asthma were made according to international guidelines, the diagnosis of AD was made according to the criteria of Hannifin and Rajka.<sup>13</sup> The diagnosis of food allergy was made according to the patient's history and SPT positivity to specific foods.

## SKIN PRICK TEST

Skin prick tests to cow's milk, egg yolk, egg white, and common aeroallergens (*Dermatophagoides pteronyssinus*, *Dermatophagoides farinea*), mixture of grass pollens (*Lolium perenne*, *Dactylis glomerata*, *Phleum pratense*, *Anthoxanthum odoratum*, *Poa pratensis*, *Festuca eliator*, *Agrostis vulgaris*, *Holcus lanatus*, *Cynodon dactylon*, *Avena sativa*, *Avena fatua*, *Lotus Corniculatus*), a mixture of grain pollens (oats, wheat, barley, corn), a mixture of tree pollens (*Acer pseudoplanatus*, *Aesculus hippocastanum*, *Robinia pseudoacacia*, *Tilia platyphyllos*, *Platanus vulgaris*), weed-mix pollens (*Medicago sativa*, *Trifolium pratense*, *Brassica nigra*, *Urtica dioica*, *Rumex acetosa*), *Alternaria alternaria*, cockroaches (*Blattella germanica*), cat dander and dog dander (Stallergenes SA, 92160 Antony, France) were performed using Quantitest. Skin prick tests were applied on the anterior surface of the forearm. Histamine (10 mg/ml) and physiological saline were used as positive and negative references, respectively. Skin reactions were evaluated 20 minutes after the application of the skin test, and indurations of  $\geq 3$  mm was considered indicative of a positive reaction.

Skin-prick tests with the same allergens were repeated in all patients after an interval of at least three years. According to test changes to the SPT, patients were divided into 3 groups as following: stable rest (Group I), new sensitization (Group II), and loss of sensitivity (Group III). More than one sensitization is called polysensitization whereas more than three defined as multi-allergen sensitivity.

## SPIROMETRY

Pulmonary function tests (PFT) were performed on children older than five able to do with spirometry (SpirolabII-MIR, Wisconsin, USA) and parameters of FVC, FEV1, PEF and MEF25-75 were measured. Values were recorded as a predicted percentage according to height and age. Patients underwent PFT during the stable period (not using  $\beta$ 2-agonists). After PFT, 200 mcg of salbutamol inhaled by inhalation chamber, and 15 minutes after PFT was repeated. Increment over 12% when compared with baseline in FEV1, 25% in FEF 25-75% was considered positive for reversibility.

## TOTAL IgE AND EOSINOPHIL COUNTS

Serum total IgE levels were analyzed with the nephelometry system (Siemens Healthcare Diagnostics, Deerfield, Germany) and values of over 100 IU/ml were considered high. Total eosinophil counts and the percentage of blood eosinophils were measured with an automated blood analyzer-ABX Pentra 80 (HORIBA Medical, Montpellier, France) and values more than 4% were considered increased.

## STATISTICAL ANALYSIS

Data was analyzed by using the program "Statistical Package for Social Sciences" (SPSS for Windows 11.0, Chicago, USA). Values for continuous variables were given as either mean  $\pm$  standard deviation or as median, based on the normality of distribution. Student t test and ANOVA was used in the comparison of normal and homogeneous distribution of the parametric values. Chi-square and Mann Whitney U test was used to compare nonparametric values. Pearson's and Spearman's correlation test was used for the correlation between the two continuous variables. McNemar test was used to compare nominal variables of the two dependent groups. Multinomial logistic regression analysis with backward elimination was used to examine the impact of variables on the susceptibility to develop new allergic reactions and for the disappearance reactions, respectively, between the 2 times of testing. In this analysis, SPT status (stable Vs new and loss of sensitivity at follow-up) was the dependent variable; age, sex, duration of breastfeeding, use of formula, family atopy, exposure to smoke, pets at home, monthly income, house changes, the presence of asthma, AR, disease duration, follow-up time, eosinophilia, elevation of IgE lev-

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