Summary
Among the trigger factors of atopic eczema (AE), aeroallergens like house dust mite, animal dander or pollen are often clinically important. The atopy patch test (APT) is an epicutaneous patch test with allergens known to elicit IgE-mediated reactions, and the evaluation of eczematous skin lesions. It can be used for the diagnosis in atopic eczema patients with suspected allergy to aeroallergens. With regard to clinical history, the atopy patch test gave more specific results than skin prick test or radioallergosorbent test.

Introduction
Atopic eczema (AE, atopic dermatitis) is a clinically defined inflammatory, chronically relapsing skin disease with a prevalence of 2–5% (in children and young adults about 10%) [22, 23, 29]. AE is a multifactorial disease with a large number of individually different trigger factors [33, 37, 55, 60]. Different names like „prurigo Besnier“, „neurodermatitis“, „endogenous eczema“, „neurodermitis constitutionalis siva atopica“ are influenced by different concepts of pathophysiology of AE. Atopy is a very common finding in patients with AE and their families [25, 29, 38]. Atopy is defined as familial tendency towards the development of certain diseases (extrinsic bronchial asthma, allergic rhinoconjunctivitis, and/or atopic eczema) based on a hypersensitivity of skin and mucous membranes against environmental substances. This is associated with elevated IgE-production and/or altered unspecific reactivity [46, 47]. The clinical definition of AE also includes a typically age-related distribution and morphology [22, 25, 67].

High IgE production in patients with AE is explained by an impaired balance of the CD4-positive T helper cell populations TH1 and TH2 with a predominance of Interleukin-4 and Interleukin-13 producing TH2-cells [21, 28, 35, 42, 56]. The inflammatory infiltrate of AE lesions consists to a large proportion of TH cells. Interleukin-4 induces IgE production [42, 63]. Some patients with AE report exacerbations of their skin lesions after contact with certain immediate-type (IgE-inducing) allergens like house dust mite, pollen or animal dander. Appropriate avoidance strategies, on the other hand, often improve the course of AE [3, 19, 44, 50, 57, 59]. Due to the epidermal barrier function disturbance that was described in AE [51], aeroallergens are obviously able to penetrate the skin barrier and to come in direct contact with antigen-presenting Langerhans cells [30]. The role of IgE in antigen presentation could recently be shown by the group of G. Stingl.
The Atopy Patch Test: Use and Perspectives

Diagnosis of Aeroallergen-Triggered Atopic Eczema

From a practical point of view, the identification of an aeroallergen causing an eczema flare in this way is of high importance for the patient. Moreover, the relevant allergen has to be identified for a successful allergen avoidance strategy. A diagnostic tool for aeroallergen-triggered AE is needed. IgE-mediated sensitizations are usually diagnosed by determination of specific serum IgE and skin prick tests or intracutaneous injections of allergen solutions [10, 46]. This reveals mostly multiple sensitizations in AE, but often without clinical relevance. Also, the skin test reactions wheal and flare are neither intended to simulate the clinical picture of eczema nor do they represent the appropriate dimension of the skin immune system. In 1937, Rostenberg und Sulzberger [48] described a total of 12,000 patch tests with a wide variety of allergens, including aeroallergens in different patient groups. However, the first patch test with aeroallergens especially in patients with AE was published 1982 by Mitchell et al. [32]. Other groups also succeeded in eliciting eczematous reactions with different methodological approaches and allergen concentrations [1, 9, 24, 36, 40, 41, 52–54, 65]. Studies on aeroallergen patch testing on untreated, nonabraded skin were an exception [64], whereas stratum corneum abrasion [20, 32, 34] or tape stripping [7, 26, 62] and addition of sodium laurylsulfate [58] were used to enhance allergen penetration. The number and definition of positive reactions in these experimental systems varied (15–100%). No clear correlation with history was obtained in larger groups of patients. In 1989, the term “atopy patch test” was proposed with the following definition: an epicutaneous patch test with allergens known to elicit IgE-mediated reactions, and the evaluation of eczematous skin lesions [43, 45]. We investigated methodological aspects and clinical covariates of the APT in order to obtain a method for clinical routine that gives positive results only in patients with AE. The results of the studies that led to an APT technique applicable on unabraded, uninvolved back skin were already reviewed in New Trends in Allergy IV [14, 15]. The use of lipophilic petrolatum vehicles, initially not expected to give better results, is now widely accepted for APT and has since been standard in our further investigations.

Allergen Preparations for the APT

All APT studies were performed after discontinuance of antihistamines, systemic and topical (test area) steroids for at least 7 days. The effect of antihistamines on APT is not known to date. We performed APT studies with allergen lyophilisates from house dust mite Dermatophagoides pteronyssinus, cat dander and grass pollen. In a lower number of patients, birch and mugwort pollen were also included. The test substances were applied in large Finn chambers (12 mm diameter) on clinically uninvolved, non-abraded and untreated back skin. In control areas, vehicles without allergens were tested. Results were evaluated after 48 and 72 h.