

The basophil activation test is a helpful diagnostic tool in anaphylaxis to sesame with false-negative specific IgE and negative skin test

U. Raap*, D. Wiczorek, F. Schenck, A. Kapp & B. Wedi

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Given the increasing popularity of life-style products including sesame in the Western diet, allergists are increasingly confronted with

allergic reactions. *Sesamum indicum* belongs to the family of pedaliaceae which had been cultivated

already 3000 BC. Consump-

tion of sesame can cause severe anaphylactic reactions in patients. Interestingly, cooking and boiling of sesame does not change the allergen structure and still can induce severe anaphylactic reactions. The prevalence of sesame allergy varies geographically, with increased allergy in regions of greatest exposure. In Israel, where sesame is regularly consumed in the diet, sesame is the third leading cause of food allergy after egg and cow's milk, and the second leading cause of anaphylaxis after milk (1).

The basophil activation test represents a helpful tool for the diagnostic workup in anaphylactic reaction to sesame.

We report about a 47-year-old man who had an anaphylactic reaction with generalized urticae and dyspnoea 15 min after consumption of Halva (sweet confection made of honey, sugar and sesame). The patient was treated with corticosteroids and antihistamines intravenously, monitored in hospital for 24 h and was admitted to our department 4 weeks later to assess possible sesame allergy.

There was no personal and no familial history for atopic diseases. Total serum IgE levels were normal (16.9 kU/l). Specific IgE Ab to sesame were not detectable (<0.35 kU/l, Uni-CAP class 0; Phadia, Uppsala, Sweden). There were no specific IgE Ab to a panel of 7 common aeroallergens or to a panel of 6 frequent food allergens. Prick-to-prick testing with sesame paste (Al Amier, RILA Feinkost Importe GmbH & Co KG Stemmweide-Levern, Germany) and prick-to-prick test with sesame seeds were negative. In addition, prick test with 13 frequent aeroallergens (ALK Scherax, Wedel, Germany) was nega-

tive. Serum tryptase was normal ($5 \mu\text{g/l}$).

Before performing an oral sesame challenge, we performed a cellular antigen stimulation test (CAST; Bühlmann Laboratories, Schönenbuch, Switzerland) and a basophil activation test (BAT; Orpegen Pharma, Heidelberg, Germany) as previously described (2) with dilutions of sesame allergen solution (Bühlmann Laboratories) and pestled sesame seeds diluted 1:10 and 1:100 with NaCl 0.9%. Using the basophil activation test, we found a dose-dependent upregulation of CD63 surface expression on basophils after stimulation with both sesame allergen solution (Fig. 1) and pestled sesame seeds in NaCl 0.9% (Fig. 1), whereas there was no reaction in four control subjects (data not shown). With cellular antigen stimulation test, we assessed no increase in de novo sulfidoleukotriene (SLT) production in our patient after stimulation with sesame allergen solution at 5 ng/ml (118 pg/ml SLT) or

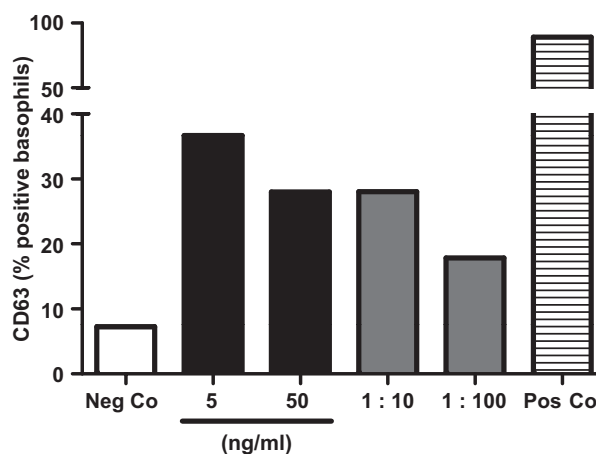


Figure 1 CD63 surface expression of basophil granulocytes derived from the patient with anaphylactic reaction to sesame. Negative control (Neg Co, no stimulation), positive control (Pos Co, using fMLP) and stimulation of basophils with either 5 or 50 ng/ml of sesame allergen solution (black bars) or pestled sesame seeds diluted in NaCl 1:10 or 1:100 (grey bars).

at 50 ng/ml (110 pg/ml SLT; positive control 2947 pg/ml SLT; negative control 111 pg/ml SLT). There was also no SLT increase using the pestled sesame seeds diluted with NaCl 1:10 (126 pg/ml SLT) or 1:100 (96 pg/ml SLT).

Thereafter, we performed a double-blind, placebo-controlled oral sesame challenge. After contact with the lips, there was no reaction after 15 min. Swallowing of one table spoon of a porridge including approximately 0.3 g sesame (according to 10 g sesame blinded in Sinlac porridge; Nestle, Weiding, Germany), the patient developed a generalized urticaria, pruritus, flush, prickling and itching at the palms, and redness and swelling of the hands after 15 min. Thus, we treated the patient with antihistamines and steroids accordingly. Serum tryptase was increased to 17 µg/ml 1 h after the positive provocation test.

In sesame allergy, it is a common problem that patients with anaphylactic reaction may have a negative skin prick test and no sesame-specific IgE antibodies (3). Indeed, skin prick test with sesame and sesame-specific IgE have been

shown to be no good predictors of true sesame allergy as determined by an oral challenge in a study including 33 children with suspected allergy to sesame (4). Thus, we propose the basophil activation test as an additional cellular test and helpful tool in the diagnostic workup of anaphylaxis to sesame as negative skin prick tests and missing specific IgE Ab can be misleading.

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We declare that we have no conflicts of interest.

*Department of Dermatology and Allergy
Hannover Medical School
Ricklingerstr. 5
30449 Hannover
Germany
Tel.: +49511-9246-233

Fax: +49511-9246-234

E-mail: Raap.Ulrike@mh-hannover.de

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References

1. Dalal I, Binson I, Reifen R, Amitai Z, Shohat T, Rahmani S et al. Food allergy is a matter of geography after all: sesame as a major cause of severe IgE-mediated food allergic reactions among infants and young children in Israel. *Allergy* 2002;**57**:362–365.
2. Raap U, Schaefer T, Kapp A, Wedi B. Exotic food allergy: anaphylactic reaction to lychee. *J Invest Allergol Clin Immunol* 2007;**17**:199–201.
3. Leduc V, Moneret-Vautrin DA, Tzen JTC, Morisset M, Guerin L, Kanny G. Identification of oleosins as major allergens in sesame seed allergic patients. *Allergy* 2006;**61**:349–356.
4. Permaul P, Stutius LM, Sheehan WJ, Rangsi-thienchai PA, Walter JE, Twarog F et al. Characterizing sesame allergy: role of specific IgE and skin prick testing in predicting food challenge results. *J Allergy Clin Immunol* 2009;**123**:S24.