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Issue 1

CAPture

A Selection of Recent Allergy Papers

SYNOPSIS

- Patients (n=35) with clinical history of *Hymenoptera* sting reactions were re-exposured by field sting (n=11) or venom immunotherapy (n=24).
- Blood samples were obtained at 2, 5 and 24 hrs after venom exposure to identify tryptase peak levels.
- Blood samples to define serum tryptase baseline levels were obtained before the venom exposure.
- Serum Tryptase was measured by ImmunoCAP® (Phadia laboratory System, Thermo Fisher Scientific, Uppsala, Sweden) with < 11.4 ng/ml used as reference value of healthy individuals at baseline.
- Serum IgE to bee and/or wasp were tested by ImmunoCAP with cut-off ≥ 0.35 kU_A/l.
- All but one patient were sensitized to bee and/or wasp
- Two of the three reactors showing less than 135% increase had a an increase of 130%.

Citation: Borer-Reinhold M et al. An increase in serum tryptase even below 11.4 ng/mL may indicate a mast cell-mediated hypersensitivity reaction: a prospective study in Hymenoptera venom allergic patients. Clin Exp Allergy 2011;41:1777-83.

Improved diagnostic value of Tryptase measurement to verify systemic allergic reactions if the peak level is related to baseline level, even within the normal range

Commercial tryptase test measures both protryptase secreted continuously (mast cell load) and β-tryptase released after mast cell activation. The authors point out that the baseline tryptase level in serum reflects the whole body mast cell load, whereas an increase within hours reflects activation and release of β-tryptase.

The aim of the present study was to test the hypothesis that an increase in tryptase level is of clinical relevance even if the peak value is below the normal reference value of 11.4 ng/ml. The hypothesis was tested by measuring serum tryptase after *Hymenoptera* venom re-exposure in patients with clinical history of *Hymenoptera* sting reactions.

When the patients' tryptase peak levels were related to their baseline levels before exposure 17 of the 20 reactors (85%) showed a 135% increase, whereas none of the non-reactors passed this level of increase ($p<0.0001$). If the routine of today was used, *i.e.* ≥ 11.4 ng/ml as cut-off, only 8 of the reactors but also 2 of the non-reactors indicated a positive reaction of tryptase activation.

The authors conclude that it is important to compare the peak value with the baseline value of serum tryptase after a suspected allergic reaction even if it is under the reference level of 11.4 ng/ml.

SYNOPSIS

- Mite allergic adult patients (n=27, median age 26 yrs, range 18-51 yrs) with mild intermittent/persistent asthma were recruited.
- Blood samples were collected 24 hrs before and 5 weeks after allergen provocation.
- Only mite-sensitized patients with serum IgE levels to mite >0.5 kU_A/l were included in the study.
- Serum IgE to house dust mite extract, the allergen components Der p 1 and Der p 2, grass pollen extract and cat allergen extract were measured by ImmunoCAP®.
- The study had a double-blind, placebo-controlled design.
- Bronchial hyper-responsiveness was determined by routine PC_{20} provocation and bronchial allergen provocation by using standardized extract of house dust mite.
- Allergen-induced cytokine production of mononuclear blood cells was measured in 96-well plates and cytokine measurements (IL-4, IL-5, IL-12, IL-13, and INF-γ) in a Luminex assay.

Citation: van de Pol MA et al. Increase in allergen-specific IgE and ex vivo Th2 responses after a single bronchial challenge with house dust mite in allergic asthmatics. Allergy 2012;67:67-73.

A single bronchial house dust mite challenge increases mite IgE antibodies in serum and Th2-related responses 5 weeks after challenge

Bronchial allergen challenge is believed to be safe since the allergen-induced effects such as bronchial responses and eosinophilic inflammation return to baseline within a few weeks. The aim of this study was to test the hypothesis that a positive reaction to a single bronchial challenge may enhance an increase in allergen-specific IgE-synthesis and a Th2-cell response to the allergen.

Serum IgE antibodies and Th2/Th1-cell responses to house dust mite were tested before and five weeks after allergen bronchial challenge in mite allergic asthmatics.

IgE antibodies to house dust mite extract and the mite allergen components Der p 1 and Der p 2 were significantly ($p<0.05$) increased (roughly 10%) 5 weeks after a challenge. No significant increase was seen in serum IgE to other sensitizing allergens of the patients. The increase in mite-specific IgE was significantly ($p<0.001$) associated ($r=0.734$) with the PC_{20} methacholine response at baseline. A significant ($p<0.001$ to $p=0.014$) increase in Th2-related (IL-4, IL-5, IL13) but not Th1-related cytokines (IL12, INF-γ) was shown in mite exposed mononuclear blood cells 5 weeks after challenge.

In conclusion the authors speculate that allergen challenge might reflect the effect of natural exposure and patients with little airway hyper-reactivity are at greatest risk since they will be exposed to highest doses to reach a decrease of 20% in FEV1 during the provocation.

SYNOPSIS

- Consecutive patients (n=27) with self-reporting reaction after eating shrimps were recruited. Age range 5-70 years (9 children <10 yrs).
- Serum IgE antibodies to shrimp extract, shrimp tropomyosin rPen a 1 (*Penaeus aztecus*) and house dust mites were measured by ImmunoCAP® with ≥ 0.35 kU_A/l as the cut-off.
- Double-blind, placebo-controlled food challenges were performed in all patients but those with typical reaction after shrimp ingestion within previous 3 months.
- Commercial synthesized overlapping peptides from different allergen components of the shrimp species *Litopenaeus vannamei* were used in a microarray: tropomyosin (Lit v 1), arginine kinase (Lit v 2), myosin light chain (Lit v 3), sarcoplasmic calcium-binding protein (Lit v 4).

Citation: Ayuso R et al. Is epitope recognition of shrimp allergens useful to predict clinical reactivity? Clin Exp Allergy 2012;42:293-304.

IgE antibodies to linear epitopes in shrimp may increase the diagnostic efficiency to reach close to 100 % sensitivity and specificity in shell fish allergy

It's known that serum IgE to the allergen component tropomyosin in shrimp has a higher diagnostic efficiency than IgE antibodies to the complete extract in diagnosing shellfish allergy. Three more crustacean allergen components have recently been described. The aim was to study if linear epitopes of these components including tropomyosin would improve the diagnostic efficiency compared to the ImmunoCAP tropomyosin test. Patients with reported reactions to shellfish and proved IgE sensitization were divided into reactors and non-reactors based on food challenge tests. Reactors showed a higher serum IgE to tropomyosin (median 7.85 *vs.* 0.38 kU_A/l) and shrimp extract (median 11.7 *vs.* 0.81 kU_A/l) compared to non-reactors. The diagnostic values of linear epitopes were studied by a microarray technique using overlapping short peptides as allergen substrates. A 100% sensitivity to identify reactors was obtained if IgE to all tropomyosin linear epitopes that showed significant difference between reactors and non-reactors were included in the microarray. When the most efficient linear epitope of the allergen component arginine kinase was used 100% specificity and 73.3% sensitivity (efficiency 84.6%) was obtained.

The results of this pilot study show the clinical usefulness to measure IgE to shrimp allergen components. Furthermore, indicates the possibility to improve the diagnostic value by using linear epitopes to design tests that give close to 100% sensitivity (negative test excludes reaction) and 100 % specificity (positive test proves reaction).

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