G. Cortellini[1], I. Spadolini[2], A. Santucci[1], V. Cova[4], C. Conti[4], A. Corvetta[1], G. Passalacqua[3]

Improvement of shrimp allergy after sublingual immunotherapy for house dust mites: a case report

[1]Rimini Hospital, Internal Medicine, Rimini, Italy, E-mail: gcortellini@libero.it
[2]Anallergo spa Immunotherapy Research, Florence, Italy;
[3]Genoa University, Allergy and Respiratory Diseases, Genoa, Italy
[4]Allergy Laboratory Unit, Area Vasta Romagna, Cesena; Italy

Key words

Tropomyosin, house doust mites, shrimps, allergen cross reactivities, specific immunotherapy

Corresponding author
Dr. G. Cortellini
Unità Operativa di Medicina Interna e Reumatologia, Ospedale Infermi, 2
Viale Settembrini, 47924 Rimini (Italy)
Phone: 0039-3391236466
E-mail: gcortellini@libero.it

Summary

The appropriateness of house dust mite specific immunotherapy in patients allergic to shrimps still remains unclear. We present a clinical case as an immunological model for the strong sensitization to tropomyosin with symptoms of anaphylaxis due to shrimps and coexisting asthma due to house dust mite. The improvement in respiratory symptoms for house dust mite and in the food challenge for shrimps during mite immunotherapy with a known and high dosage of tropomyosin suggests the hypothesis that efficacy of mite immunotherapy in food allergy to tropomyosin may be dose dependent

introduction

Some studies have suggested that specific immunotherapy (SIT) to pollens can improve also the associated food allergy. This has been shown for instance, with birch allergy and apple-induced oral allergy syndrome, since a protection towards Mal d 1, homologous to Bet v 1, is achievable. With tropomyosin, which is shared by mites (Der p 10 component) and shrimps (Pen a 1 component), the results are less clear.

In some cases, the cross-reactivity between different animal species can represent a clinical risk. For instance, it was reported that allergy to snails is a risk factor for anaphylactic episodes in patients receiving immunotherapy to mites (1, 2), although in this case tropomyosin is probably not the responsible cross-reactive allergen (3). Van Ree and Antonicelli (4) suggested to investigate mite allergic patients for allergy to snail and other invertebrate animal foods, because snail consumption can cause severe asthmatic symptoms in patients allergic to house-dust-mite. Thus, also the sensitization to tropomyosin suggests caution about the use of mite immunotherapy also in patients allergic to foods containing tropomyosin, such as shrimps. Indeed, in the case of shrimps some authors (5, 6) demonstrated the absence of neo-sensitization to tropomyosin in patients receiving immunotherapy to mite.

One of the main problems is that often we do not know the content of tropomyosin in extracts for specific immunotherapy to house dust mite. Thus, in patients allergic to shrimps and dust mites maybe we administer specific immunotherapy with a dose of tropomyosin that is too low for desensitization, but high enough to sensitize the patients . This is of clinical relevance, since the presence of allergy to shrimps is currently a hypothetic contraindication to specific immunotherapy for house dust mites (3)

Case Report

A 15 year-old male came to our observation for mild persistent asthma and rhinitis due to mites, and concomitant allergy to shrimps and seafood, with anaphylactic symptoms: urticaria, glottis oedema, asthma, enteritis. The diagnosis of asthma and rhinitis was made according to guidelines and the sensitization to mite and shrimp was documented by positive skin prick tests and CAP assay. At the time of diagnosis, a food challenge was not performed, due to the severity of the reactions, documented by clinical history (emergency department visits and use of adrenaline). The results of the tests are summarized in table 1.

Immunoblotting displayed the presence of IgE specific to tropomyosin (36 kD) in the patient's serum. In correspondence of this protein band, a strong reactivity to crustaceans and shellfish was also identified (Figure 1). We also detected a spot in the tropomyosin protein band (36 kD) in the extract of mites. The absence of any signal in the negative control of immunoblotting (Parietaria and cypress) confirmed that the positive signal obtained with the serum of this allergic patient was not due to nonspecific bonds. Thus, Immunoblotting confirmed the presence of IgE for tropomiosyn in the patients' serum as well as the presence of tropomisyn in the SLIT extract for mites.

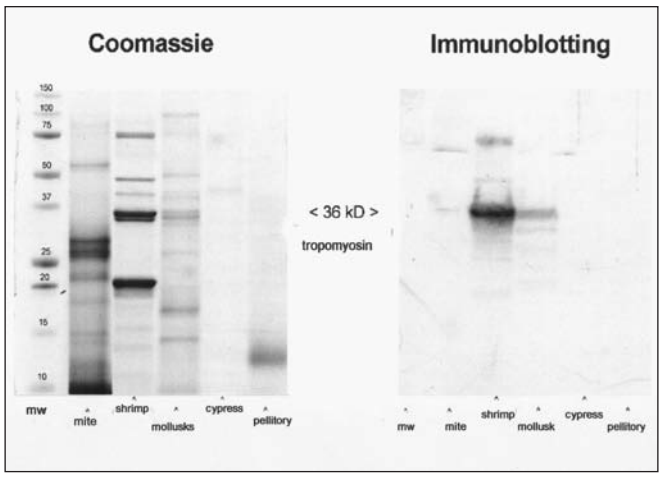
Three years ago, in November 2008 after obtaining an informed consent from parents, the patient started sublingual immunotherapy (SLIT) for house dust mites. The mean content of tropomyosin in the extract (Anallergo,Florence®) resulted to be 1.6 μg/mL. Before SLIT patient underwent an oral challenge with a single shrimp, kept in mouth without ingesting it. The challenge was immediately interrupted because of oral allergy syndrome, epigastralgia and dyspnea.

The patient underwent SLIT without any adverse events. The maintenance dose, regularly achieved, was 5 drops a day for 12 months, that is twice the recommended dose. This was done to achieve a high enough cumulative dose of tropomyosin, that was 146 μg.

After 12 months the symptom/medication score decreased by approximately 40% and drug intake for asthma and rhinitis also decreased by 40%. At 12 months an oral challenge with 1single shrimp was done, and it caused only an oral allergic syndrome, without systemic symptoms. In addition, the patient accidentally ate shrimps in small quantities at home, without any symptoms.

After 12 months of SLIT the average diameter of skin prick test to shrimps was 5 mm; to dermatophagoides pteronyssinus 10 mm and to dermatophagoides farinae 6 mm. Specific IgE to tropomyosin slightly increased to 53 kU/L, whereas no relevant change was seen in the remaining parameters (Table 1).

Figure 1 -



Discussion

The appropriateness of house dust mite specific immunotherapy in shrimp allergic patients still remains a mat-

Table 1 -

	Before SLIT	After SLIT
Dermatophagoides far prick mm	12,00	6,00
Dermatophagoides far IgE KU	55,10	70,50
Dermatophagoides far IgG mg/ml	18,20	21,50
Dermatophagoides far IgG4 mg/ml	0,17	0,16
Pen A1 IgE KU/ml	45,50	53,10
Pen A1 IgG mg/ml	2,00	2,00
Pen A1 IgG4 mg/ml	0,03	0,07
Shrimp prick mm	9,00	5,00
Shrimp IgE Ku	62,00	79,70
Shrimp IgG mg/ml	3,00	4,20
Shrimp IgG4 mg/ml	0,12	0,18
IgE	600,00	697,00

ter of debate. Anyway an evaluation of the presence of tropomyosin in extracts for immunotherapy, as well as the demonstration of sensitization to tropomyosin in patients allergic to shrimp and house dust mite are essential.
The case herein described is a suitable immunological model because it is a natural experiment represented by the high-tropomyosin sensitization with anaphylactic symptoms related to shrimps allergy, and contemporary symptoms of asthma related to dust mites allergy.
The improvement of clinical and biological data in this patient suggests the hypotesis that side effects during mite immunotherapy in patients with food shrimps allergy depends on a low dose of tropomyosin in extracts, that may induce sensitization. On the other hand, high tropomyosin amounts can promote food desensitization

References

1. Peroni DG, Piacentini GL, Bodini A, Boner AL. Snail anaphylaxis during house dust mite immunotherapy.Pediatr Allergy Immunol. 2000 Nov;11(4):260-1
2. Pajno GB, La Grutta S, Barberio G, Canonica GW, Passalacqua G. Harmful effect of immunotherapy in children with combined snail and mite allergy.J Allergy Clin Immunol. 2002 Apr;109(4):627-9.
3. Bessot JC, Metz-Favre C, Rame JM, De Blay F, Pauli G. Tropomyosin or not tropomyosin, what is the relevant allergen in house dust mite and snail cross allergies?.Eur Ann Allergy Clin Immunol. 2010 Feb;42(1):3-10.
4. van Ree R, Antonicelli L, Akkerdaas JH, Garritani MS, Aalberse RC, Bonifazi F. Possible induction of food allergy during mite immunotherapy.Allergy. 1996 Feb;51(2):108-13
5. Asero R.Lack of de novo sensitization to tropomyosin in a group of mite-allergic patients treated by house dust mite-specific immunotherapy. Int Arch Allergy Immunol. 2005 May;137(1):62-5. Epub 2005 Apr 12.
6. Rossi RE, Monasterolo G, Incorvaia C, Moingeon P, Frati F, Passalacqua G, Rossi L, Canonica GW. Lack of neo-sensitization to Pen a 1 in patients treated with mite sublingual immunotherapy.Clin Mol Allergy. 2010 Mar 15;8:4.
7. Antonicelli L, Mariano M. Mite immunotherapy and food allergy to snail.Allergy. 2003 Aug;58(8):821; author reply 822-3.
8. Shanti KN,Martin BM,Napgal S,Metcalfe DD,Subba Rao PV.Identification of tropomyosin as the major shrimp allergen and characterization of its IgE – binding epitopes. J Immunol 1993;151:5354-63
9. Aki T, Kodama T, Fujikawa A, Miura K, Shigeta S, Wada T, Jyo T, Murooka Y, Oka S, Ono K.Immunochemical characterization of recombinant and native tropomyosins as a new allergen from the house dust mite, Dermatophagoides farinae.J Allergy Clin Immunol. 1995 Jul;96(1):74-83.
10. Villalta D, Tonutti E, Visentini D, Bizzaro N, Roncarolo D, Amato S, Mistrello G.Detection of a novel 20 kDa shrimp allergen showing cross-reactivity to house dust mites.Eur Ann Allergy Clin Immunol. 2010 Feb; 42(1): 20-4.
11. Iparraguirre A, Rodríguez-Pérez R, Juste S, Ledesma A, Moneo I, Caballero ML.Selective allergy to lobster in a case of primary sensitization to house dust mites.J Investig Allergol Clin Immunol. 2009; 19(5): 409-13.
12. Purohit A, Shao J, Degreef JM, van Leeuwen A, van Ree R, Pauli G, de Blay F.Role of tropomyosin as a cross-reacting allergen in sensitization to cockroach in patients from Martinique (French Caribbean island) with a respiratory allergy to mite and a food allergy to crab and shrimp.Eur Ann Allergy Clin Immunol. 2007 Mar; 39(3): 85-8.
13. Bernardini R, Mistrello G, Novembre E, Roncarolo D, Zanotta S, Lombardi E, Cianferoni A, Pucci N, De Martino M, Vierucci A.Cross-reactivity between IgE-binding proteins from Anisakis simplex and Dermatophagoides pteronyssinus.Int J Immunopathol Pharmacol. 2005 Oct-Dec; 18(4): 671-5.
14. DeWitt AM, Mattsson L, Lauer I, Reese G, Lidholm J.Recombinant tropomyosin from Penaeus aztecus (rPen a 1) for measurement of specific immunoglobulin E antibodies relevant in food allergy to crustaceans and other invertebrates. Mol Nutr Food Res. 2004 Oct; 48(5): 370-9.
15. Boquete M, Iraola V, Morales M, Pinto H, Francisco C, Carballás C, Carnés J. Seafood hypersensitivity in mite sensitized individuals: is tropomyosin the only responsible allergen? Ann Allergy Asthma Immunol. 2011 Mar; 106(3): 223-9. Epub 2010 Dec 23.