

PRACTICAL USE OF ALLERGENIC MOLECULES

R. Asero (1)

During the last century allergology has been based on the use of natural allergen extracts both for diagnostic and therapeutic purposes. Although such extracts have been more and more purified and standardized over the years they show some major disadvantages that cannot be eliminated: (a) the presence of an array of both allergenic and non-allergenic molecules and (b) a variability in the amount of single allergenic proteins from one batch to another. Of course these extracts are still useful to detect patients sensitised to a certain allergen source by in vivo and in vitro tests, but they don't give us any information about the relevant allergenic molecule(s) involved. Another aspect is that the use of natural extracts for specific immunotherapy is associated with a theoretical risk of de-novo sensitisation to proteins to which the patient was not sensitised when treatment was started (1,2). During the last decade an array of allergenic molecules have been identified, cloned and sequenced by molecular biology techniques, and many recombinant allergenic have been produced. While it will probably take many years before these molecules will be used for the so-called "tailored immunotherapy" (3), some of them are already routinely available for in-vitro testing. We can presently measure the levels of IgE specific for a number of recombinant grass pollen allergens (Phl p 1, Phl p 2, Phl p 4, Phl p 5, Phl p 6, Phl p 7, Phl p 11, and 12), major and minor birch pollen allergens (Bet v 1, Bet v 2, and Bet v 4), and major allergens from ragweed pollen (Amb a 1), mugwort pollen (Art v 1), and pellitory (Par j 2), and several allergens from the mould *Aspergillus* (Asp f 1, 2, 4, and 6). Moreover, microarrays able to detect IgE to a very large spectrum of both airborne and food allergens in recombinant form with a minimal amount of serum are already available, although their high cost presently hampers their routine use.

Even if we still have to treat eventually patients with natural extracts (i.e. with mixtures of both allergenic and non-allergenic proteins) the practical usefulness of these new diagnostic tools is clearly apparent, particularly under certain circumstances. A good example is the detection of relevant allergenic molecules in patients showing multiple sensitisations on SPT and/or RAST. In these subjects, who represent a significant proportion of patients with airborne allergy seen in allergy clinics, the main problem is to diagnose whether multi-reactivity is the result of co-sensitisation (i.e. if they are really sensitised to many, distinct allergenic molecules) or of co-recognition (i.e. if they are sensitised to allergenic sources bearing homologous molecules) (4). This information is essential if one considers that in patients of the latter type immunotherapy with one single extract containing an adequate amount of the cross-reacting allergen(s) might be sufficient to treat properly the "poly-sensitised" allergic subject. Another typical situation where a molecular approach to the diagnosis may be extremely useful is allergy to plant derived foods. In this case, the physical/chemical characteristics of the allergenic protein profoundly influence the clinical expression of allergy, and several plant-food allergens are largely cross-reacting among botanically unrelated fruits and vegetable. Thus, knowing the identity of the relevant allergenic protein may have prognostic as well as preventive value.

Clearly, for a proper management of diagnostic and therapeutic problems using allergenic molecules a good knowledge of the clinical/immunologic significance of allergenic molecules is essential.

The main airborne cross-reacting allergens (4) include:

- Bet v 1, the major birch pollen allergen, that cross-reacts with homologous proteins in Fagales pollen as well as in several fruits and vegetables.
- Bet v 2, profilin, a pan-allergen cross-reacting with homologous proteins present in most pollens and in a large number of vegetable foods.

(1) Ambulatorio di Allergologia, Clinica San Carlo, Paderno Dugnano (Italy).

- Polcalcins, largely cross-reacting among pollens. Phl p 7 (as well as Bet v 4) can be used as a marker of sensitisation to this protein.
 - Ole e 1, the major olive pollen allergen, cross-reacting with all other Oleaceae.
 - Phl p 1 and Phl p 5, markers of sensitization to grass group 1 and group 5 allergens, respectively.
 - Enolase, a cross-reacting mould allergen.
- Among vegetable foods the main cross-reacting allergens other than those cited above include:
- Lipid transfer protein (Rosaceae, tree nuts, peanuts, cereals, etc)
 - 2S albumins (Walnut, Hazelnut, Peanut, Brazil nut, Sesame seeds, Castor seed, Mustard)
 - Vicilins (Sesame, Peanut, Tree nuts)
 - Legumins (Tree nuts, Peanut)

Although specific diagnostic tools for food allergens are still lacking, the use of some indirect

"markers" (e.g. rBet v 1, rBet v 2, certain SPT) will be helpful in classifying most patients in a proper way.

References

1. Moverare R., Elfman L., Vesterinen E., Metso T., Haathela T. - Development of new IgE specificities to allergenic components in birch pollen extract during specific immunotherapy studied with immunoblotting and Pharmacia CAP system. *Allergy* 2002;57:423-30.
2. Ball T., Sperr W.-R., Valent P., Lidholm J., Spitzauer S. *et al.* - Induction of antibody responses to new B cell epitopes indicates vaccination character of allergen immunotherapy. *Eur J Immunol* 1999;29:2026-36.
3. Valenta R., Lidholm J., Niederberger V. *et al.* - The recombinant allergen-based concept of component-resolved diagnostics and immunotherapy. *Clin Exp Allergy* 1999;29:896-904.
4. Ferreira F., Hawranek T., Gruber P., Wopfner N., Mari A. - Allergic cross-reactivity : from gene to the clinic. *Allergy* 2004;59 243-67.



Press Releases

PLAN AHEAD FOR A SAFE BACK TO SCHOOL WITH ALLERGIES AND ASTHMA

MILWAUKEE — Before long, it will be time to return to the classroom, recess and school lunches for millions of American students. However, taking part in those activities require a bit more planning for the 9 million children under the age of 18 who suffer from asthma and allergies. According to the American Academy of Allergy, Asthma & Immunology (AAAAI), students with allergies, and their parents, should take the following precautions before the school year begins:

- Make sure your child has their medications and peak flow meter with them at school. If your child has severe food or insect allergies and an epinephrine auto-injector, make sure their teacher knows how to use the device;
- If your child has food allergies, inform the school principal, teachers and school cafeteria staff of what foods to avoid;
- Inform physical education teachers and coaches about asthma and warning signs of an asthma attack.
- Make sure an asthma or food allergy action plan is on file for your child at school; asthma and food allergy action plans can be found at www.aaaai.org;
- Talk to your child and review what triggers their allergy or asthma symptoms. Encourage them to ask their teacher for help when symptoms worsen;
- Work with your child's allergist/immunologist to ensure their medications are helping. If you don't have an allergist/immunologist, visit www.aaaai.org/physref to find one in your area.

If you would like to interview an allergist about a safe start to the school year with allergies and asthma, contact the AAAAI media relations staff at (414) 272-6071, or email Public Relations Manager Karen Janka (kjanka@aaaai.org) or Communications Coordinator Natalie Lemke (nlemke@aaaai.org).
American Academy of Allergy, Asthma & Immunology - 555 E. Wells Street - Suite 1100 - Milwaukee, WI 53202-3823

You have received this message because you have had previous contact with the American Academy of Allergy, Asthma & Immunology. If you do not wish to be included in our mailing list, please forward this message to info@aaaai.org.