

f428 rCor a 1

rCor a 1 from hazelnut (*Corylus avellana*)

Clinical Utility

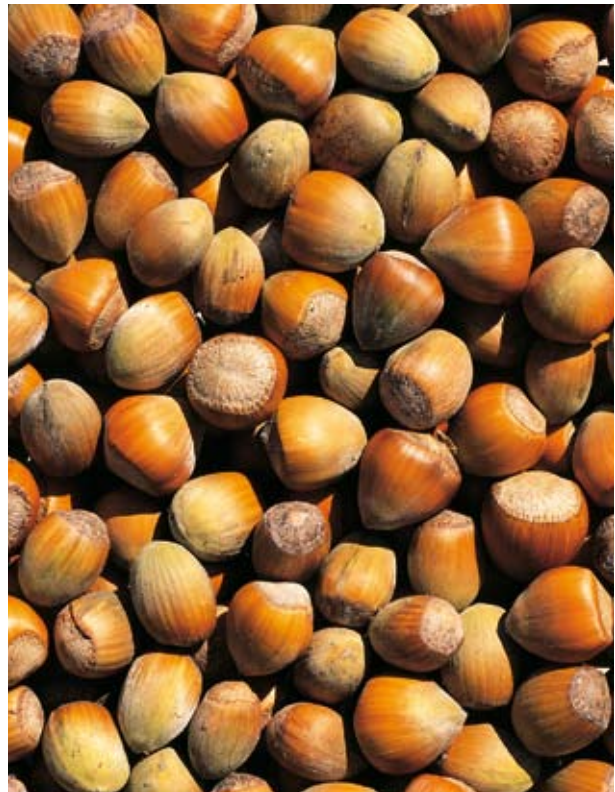
Hazelnut is one of the most frequently observed sources of food allergy (1-3). In populations from Northern Europe and other Fagales-rich (birch, alder, hazel, hornbeam, and oak) regions, reactions are in most cases elicited by Cor a 1. Cor a 1 is an allergen of the PR-10 protein family with about 65% sequence homology to Bet v 1, the major allergen in birch pollen. ImmunoCAP® Allergen rCor a 1 (f428) is useful in identifying individuals with birch pollen related allergy to hazelnut. Sensitization to PR-10 proteins is most often associated with milder symptom such as the oral allergy syndrome (OAS).

Allergen Description

Cor a 1 is a 17.4 kDa protein and a Bet v 1 homologue, which is also recognised as a PR-10 protein. The allergen is found in hazel pollen as well as in the nut. However, the isoforms present in the nut are distinct from those identified in hazel pollen and IgE cross-reactivity between the nut protein and the pollen protein is only partial. Cor a 1 is heat-labile protein. Heat treatment destroys the native three-dimensional molecular structure of PR-10 proteins and the IgE-binding has been shown to be significantly decreased after heating and activity of Cor a 1 was shown to be absent in roasted hazelnut meal (4-6).

Clinical Experience

In Europe the prevalence of hazelnut allergy is estimated to be between 0.1% and 0.5% (7-8). Studies have shown that most hazelnut-allergic individuals in central and northern Europe are sensitized predominantly to Cor a 1, whereas in the south of Europe the predominant sensitization is to Cor a 8 (9-12). This relationship can also be seen in **figure 1**. Cor a 1 is associated mainly with mild adverse reactions such as OAS, whereas Cor a 8 is associated with more severe adverse reactions, including anaphylaxis (9). The 11S globulin Cor a 9 may be a prominent pollen-independent hazelnut allergen in the United States (12).



Cross-Reactivity

Cor a 1 may be a useful tool to assess potential PR-10 mediated cross-reactions to a range of pollen allergens. PR-10 proteins have been identified not only in pollen from *Fagales* (birch, alder, hazel, hornbeam and oak) but also in a range of fruits and vegetables such as apples, carrots, celery, stone fruits. In some, but not all, cases the immunological cross-reactivity is expressed as clinical reactions to the plant foods (13-14).

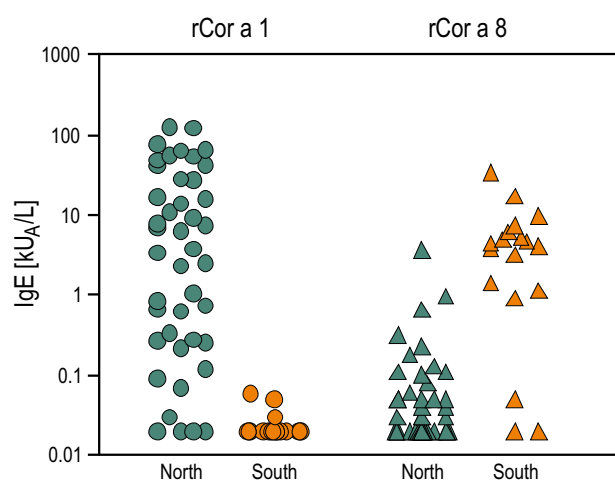


Figure 1. Hazelnut positive samples from north Europe (n=43) and south Europe (n=18) tested with rCor a 1 and rCor a 8 respectively.

References

1. ROEHR CC, EDENHARTER G, REIMANN S, EHLERS I, WORM M, ZUBERBIER T, NIGGEMANN B.
Food allergy and non-allergic food hypersensitivity in children and adolescents.
Clin Exp Allergy 2004 Oct;34(10):1534-41.
2. SCHÄFER T, BÖHLER E, RUHDORFER S, WEIGL L, WESSNER D, HEINRICH J, FILIPIAK B, WICHMANN HE, RING J.
Epidemiology of food allergy/food intolerance in adults: associations with other manifestations of atopy.
Allergy 2001 Dec;56(12):1172-9.
3. MEHL A, WAHN U, NIGGEMANN B.
Anaphylactic reactions in children-a questionnaire-based survey in Germany.
Allergy 2005 Nov;60(11):1440-5.
4. WORM M, HOMPES S, FIEDLER EM, ILLNER AK, ZUBERBIER T, VIETHS S.
Impact of native, heat-processed and encapsulated hazelnuts on the allergic response in hazelnut-allergic patients.
Clin Exp Allergy 2008 Nov 19.
5. HANSEN KS, BALLMER-WEBER BK, LÜTTKOPF D, SKOV PS, WÜTRICH B, BINDSLEV-JENSEN C, VIETHS S, POULSEN LK.
Roasted hazelnuts – allergenic activity evaluated by double-blind, placebo-controlled food challenge.
Allergy 2003 Feb;58(2):132-8.
6. WENSING M, PENNINKS AH, HEFLE SL, AKKERDAAS JH, VAN REE R, ET AL.
Determination of threshold levels of patients with hazelnut allergy using double-blind placebo-controlled food challenges (DBPCFC'S).
[Poster] 8th International Symposium on Problems of Food Allergy 2001, ch 11-13, Venice.
7. DE GROOT H, DE JONG NW, VUIJK MH, GERTH VAN WIJK R.
Birch pollinosis and atopy caused by apple, peach, and hazelnut; comparison of three extraction procedures with two apple strains.
Allergy 1996;51(10):712-8.
8. TARIQ SM, STEVENS M, MATTHEWS S, RIDOUT S, TWISLTON R, HIDE DW.
Cohort study of peanut and tree nut sensitisation by age of 4 years.
BMJ 1996;313(7056):514-7.
9. SCHOCKER F, LÜTTKOPF D, SCHEURER S, PETERSEN A, VIETHS S, BECKER WM.
Cloning and sequencing of the lipid transfer protein from hazelnut (*corylus avellana*).
Poster] 8th International Symposium on Problems of Food Allergy, Venice. 2001, March 11-13.
10. PASTORELLO EA, VIETHS S, PRAVETTONI V, FARIOLI L, TRAMBAIOLI C, FORTUNATO D, LUTTKOPF D, CALAMARI M, ANSALONI R, SCIBILIA J, BALLMER-WEBER BK, POULSEN LK, WUTRICH B, HANSEN KS, ROBINO AM, ORTOLANI C, CONTI A.
Identification of hazelnut major allergens in sensitive patients with positive double-blind, placebo-controlled food challenge results.
J Allergy Clin Immunol 2002;109(3):563-70.
11. ANDERSSON K, BALLMER-WEBER BK, CISTERO-BAHIMA A, OSTLING J, LAUER I, VIETHS S, LIDHOLM J.
Enhancement of hazelnut extract for IgE testing by recombinant allergen spiking.
Allergy 2007;62(8):897-904.
12. SCHOCKER F, LUTTKOPF D, SCHEURER S, PETERSEN A, CISTERO-BAHIMA A, ENRIQUE E, SAN MIGUEL-MONCIN M, AKKERDAAS J, VAN REE R, VIETHS S, BECKER WM.
Recombinant lipid transfer protein Cor a 8 from hazelnut: a new tool for *in vitro* diagnosis of potentially severe hazelnut allergy.
J Allergy Clin Immunol 2004;113(1):141-7.
13. VIETHS S, SCHEURER S, BALLMER-WEBER B.
Current understanding of cross-reactivity of food allergens and pollen.
Ann N Y Acad Sci 2002 May;964:47-68.
14. KONSTANTINOOU GN, GRATTAN CE.
Food contact hypersensitivity syndrome: the mucosal contact urticaria paradigm.
Clin Exp Dermatol 2008 Jul;33(4):383-9.

For further reading, see: www.immunocapinvitrosight.com