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Letter to the Editor

Anaphylaxis to PR-10 hazelnut

Anaphylaxie aux protéines PR-10 de la noisette

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To the editor,

Pathogenesis-related-10 (PR-10) proteins are ubiquitous, highly cross-reactive panallergens that are expressed in high concentrations in reproductive tissues such as pollen, seeds, and fruits. In general, PR-10 proteins are labile at extreme pH conditions and their structure is affected by heat treatment. When consumed, they are known to induce mild local reactions in patients, generally oral allergy syndrome [1].

Herein we report the case of a 9-year-old Serbian girl who was referred to the Department of Paediatric Allergology at the University Hospital Centre of Toulouse, France. The patient's medical history included atopic dermatitis, rhinoconjunctivitis caused by an allergy to birch and grass pollen, oral allergy syndrome induced by apples, prunes, kiwi fruit, and an episode of myelitis of unknown aetiology two years earlier. The patient was not taking any kind of medication. Her father had rhinoconjunctivitis caused by ragweed pollen allergy.

The girl experienced an anaphylactic reaction one afternoon in May. She had eaten beef bourguignon with green beans for lunch. She went to her indoor tennis practice from 3:00 PM to 4:30 PM, and then did gymnastics outdoors. Between the two workouts, she consumed a Nutella® B-Ready® bar, at around 4:30 PM. Thirty minutes later, at 5:00 PM, she started to develop pruritus, at first on the lower limbs, then rapidly generalizing with the appearance of hives, facial swelling, shortness of breath, and difficulties in speaking. She was driven to the Paediatric Emergency Service. On admission, she had tachycardia, without arterial hypotension. The pulmonary examination found wheezing. Hives covered 90% of the body surface. There were no digestive signs. She was given adrenaline by intra-muscular injection combined with injection of antihistamine and corticosteroids (2 mg/kg). Her condition rapidly improved and she was kept in hospital under medical observation for 24 hours.

She returned six weeks later for a follow-up allergology consultation. Serum tryptase level was elevated during the acute

phase (12.6 µg/L at M90), and baseline tryptase level was 3.23 µg/L, indicating a significant increase of 120% + 2 µg/L [2]. She had no further anaphylactic reactions. The clinical examination was normal. Beef and green beans were consumed once more but without any reaction. A Nutella® B-Ready® bar was also consumed again without any reaction, but the girl took no physical exercise. The composition of Nutella® B-Ready® bars is as follows: hazelnut and cocoa spread 81.5% (sugar, palm oil, hazelnuts 13%, skimmed milk powder 8.7%, lean cocoa 7.4%, emulsifiers: lecithin [soy], vanillin), flour wheat 16%, brewer's yeast, barley malt extract, salt, skimmed milk powder, emulsifiers: lecithin (soy); wheat protein, milk protein, water.

Skin-prick tests were positive for native hazelnuts (12 mm), native peanuts (2 mm), birch (2 mm), ash (4 mm), cat (2 mm) and grasses (2 mm), with a positive control (histamine) at 3 mm. They were negative for moths, plantain, shrimps and dog.

The specific IgE results are detailed in Table 1.

In summary, this girl presented a severe anaphylactic reaction of grade III on the Ring and Messmer classification [3]. There were cofactors, such as marked physical effort before the snack, followed by further effort after the snack in significant heat. There was no associated medication. The results confirmed the presence of hazelnut allergy with a PR-10 protein sensitization profile, which causes crossed allergies to pollen, including birch, as well as many fruits, thus accounting for the oral food syndrome. Although this allergic profile is usually associated with mild local reactions, in the present case, along with cofactors [4] (intense physical effort, heat), it triggered an anaphylactic reaction. Nutella® B-Ready® bars had previously been consumed without reaction, but this was the first time that the product was associated with effort.

We agreed with the family that hazelnut consumption should be avoided several hours before physical exercise and up to 3 hours after. During these periods, we also advised avoidance of consumption of soy (frequently present in energy drinks), peanut (cutaneous sensitization with PR-10 positivity), as well

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Table 1
Blood samples of specific IgEs antibodies.

Phadia Thermo scientific, Specific IgEs (0–100)	(kUA/L)
Birch PR-10 component, rBet v1 (t215)	>100
Cow milk (f2)	<0.10
Cow milk component, nBos d4 (f76)	<0.10
Cow milk component, nBos d5 (f77)	<0.10
Cow milk component, nBos d8 (f78)	<0.10
Hazelnut (f17)	>100
Hazelnut PR-10 component, rCor a1 (f428)	>100
Hazelnut LTP component, rCor a8 (f425)	<0.10
Hazelnut storage protein component, rCor a9 (f440)	<0.10
Hazelnut storage protein component, rCor a14 (f439)	<0.10
Peach PR-10 component, rPru p1 (f419)	81.5
Peach LTP component, rPru p3 (f420)	0.16
Peach Profilin component, rPru p4 (f421)	<0.10
Peanut PR-10 component, rAra h8 (f352)	72.5
Wheat LTP component, rTri a14 (f433)	<0.10
Wheat component, rTri a19 (f416)	<0.10
αgal (o215)	<0.10

LTP: Lipid transfer protein; PR-10: Pathogenesis-related-10. Bold indicates elevated specific IgEs.

as those foods for which the girl already had an oral syndrome (apple, prune, kiwi). The emergency kit with the adrenaline pen was maintained, and its utilization was reviewed. A written personalized anaphylaxis emergency action plan was delivered [5].

The occurrence of PR-10-mediated anaphylactic reactions has already been reported in the literature for soybean [6], apple [7], and almond [8]. However, to our knowledge, this is the first case of anaphylaxis reported for the PR-10 hazelnut. Vanstreels et al. described a case of hazelnut anaphylaxis with PR-10 sensitization, but there was also LTP sensitization (PR-14) [9]. We nevertheless acknowledge that sensitization to a hazelnut protein other than PR-10, which we cannot measure, cannot be completely ruled out.

Consumption of hazelnuts without physical effort did not trigger anaphylaxis previously. This case therefore illustrates the importance of cofactors, which can affect the severity of an allergic reaction. The allergist must therefore remain vigilant for PR-10 proteins, which can in fact cause harm, and must not neglect the importance of cofactors in evaluating reactions and in the therapeutic education of patients and their families.

Contribution of authors

All authors contributed equally to this work.

Disclosure of interest

The authors declare that they have no competing interest.

References

- [1] Matricardi, et al. EACCI molecular allergy user's guide. *Pediatr Allergy Immunol* 2016;27(23):1–250.
- [2] Stone SF, Cotterell C, Isbister JK, et al. Elevated serum cytokines during human anaphylaxis: identification of potential mediators of acute allergic reactions. *J Allergy Clin Immunol* 2009;124(4), 786.e4–792.e4.
- [3] Ring J, Messmer K. Incidence and severity of anaphylactoid reactions to colloid volume substitutes. *Lancet* 1977;1(8009):466–9.
- [4] Niggemann B, Beyer K. Factors augmenting allergic reactions. *Allergy* 2014;69:1582–7.
- [5] Simons FE, Arduzzo LR, Bilo MB, et al. World Allergy Organization anaphylaxis guidelines: summary. *J Allergy Clin Immunol* 2011;127:587–9.
- [6] Kleine-Tebbe J, Vogel L, Crowell DN, et al. Severe oral allergy syndrome and anaphylactic reactions caused by a Bet v 1-related PR-10 protein in soybean, SAM22. *J Allergy Clin Immunol* 2002;110(5):797–804.
- [7] Röseler S, Balakirski G, Plange J, et al. Anaphylaxis to PR-10 proteins (Bet v1 homologues). *Hautarzt* 2013;64(12):890–2, <http://dx.doi.org/10.1007/s00105-013-2683-1>.
- [8] Senders AS, Oropeza AR, Kristensen B, et al. Food-dependent exercise-induced anaphylaxis due to almond in a PR-10-sensitized patient. *J Allergy Clin Immunol Pract* 2018;6(2):683–4, <http://dx.doi.org/10.1016/j.jaip.2017.12.01> [Epub 2018 Feb 13].
- [9] Vanstreels L, Balakirski G, Röseler S, et al. Double sensitization to PR10 and PR-14 proteins. *Hautarzt* 2014;65(12):1017–8, <http://dx.doi.org/10.1007/s00105-014-3540-6>.

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