

## Pistachio Allergens: The Long Journey Between Mother and Daughter

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The protective and beneficial effect of breastfeeding on neonatal health is widely accepted. However, whether breastfeeding protects against the development of allergies remains controversial [1]. It has been hypothesized that early sensitization to food allergens may be due to breastfeeding, although transmission can also be intrauterine or transcutaneous.

We present an exceptional case of a 2-year-old girl who occasionally developed facial wheals during breastfeeding. She had a history of cow's milk allergy (now resolved) and egg allergy. The child ate a wide range of foods and continued to receive breastfeeding on demand. She had no personal history of atopic dermatitis or asthma. At 22 months of age, she experienced 2 episodes of facial hives during breastfeeding that resolved spontaneously within 2 hours. These events were separated by 2 months, and she tolerated intermediate feedings of breast milk. On both occasions, the mother had eaten a large quantity of pistachios an hour earlier. The patient had previously tolerated almond milk, crushed hazelnuts, and sesame; no other nuts had been introduced into the diet.

Breast milk was collected to analyze whether the presence of pistachio allergens could induce an immediate allergic reaction after ingestion. Considering that the time from ingestion to peak concentration in breast milk for peanuts, eggs, milk, and wheat described in the literature is around 1 to 6 hours [2,3] and that these usually clear quickly from breast milk [4], the mother was instructed to consume 100 g of pistachio 12, 5, and 1 hour before the collection of 150 mL of breast milk (PBM1h). A further 150 mL of breast milk was collected after 24 hours of pistachio intake (PBM24h). The

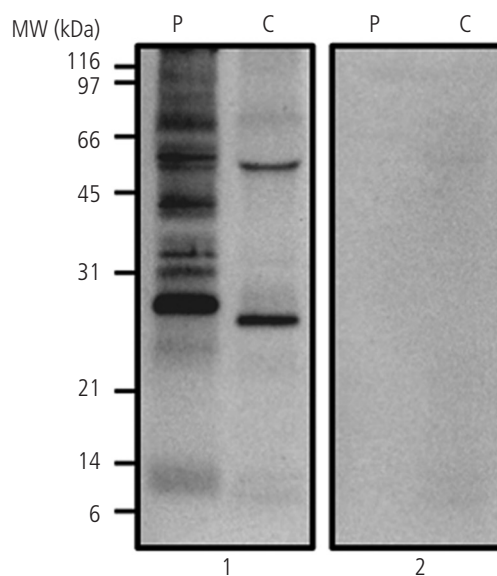
mother gave her written informed consent document before beginning the study.

Skin prick tests (SPTs) with commercial nut extracts (Leti Pharma Laboratories) and skin prick-prick tests (SPPTs) with the corresponding PBM1h and PBM24h samples were performed. Total and specific serum IgE (sIgE) to nut, peanut, walnut, and cashew proteins were determined using ImmunoCAP (Thermo Fisher Scientific), considering values above 0.35 kU<sub>A</sub>/L to be positive. The SPT result was positive for pistachio (12 mm), cashew (11 mm), and walnut (3 mm). The results for histamine and the negative control were 4 and 0, respectively. The IgE results were as follows: total, 30.1 kU/L; pistachio, 0.99 kU/L; cashew, 0.39 kU/L; walnut, 0.6 kU/L; peanut, 0.09 kU/L; rAna o 3, 0.42 kU/L; rJug r 1, 0.49 kU/L; rJug r 3, 0.01 kU/L; and rPru p 3, 0.01 kU/L. The results of SPPT to PBM1h and PBM24h were negative.

An SDS-PAGE IgE immunoblot analysis of the patient's serum revealed 6 bands with approximate molecular weights of 70, 55, 40, 34, 32, and 28 kDa in the pistachio extract and 2 IgE bands of 55 and 28 kDa in the cashew extract (Figure, panel 1). Panel 2 in the Figure shows the SDS-PAGE IgE immunoblot analysis incubated with negative control serum.

An oral challenge was performed with PBM1h to confirm the diagnosis. Breast milk was administered by syringe to avoid skin contact. Ten minutes after the first dose of breast milk (10 mL), the patient developed facial and neck erythema and wheals, which subsided spontaneously after 20 minutes. The mother was instructed to follow a pistachio- and cashew-free diet. Since then, the patient has experienced no further reactions during feeds.

To date, various food allergens have been shown to be present in breast milk. Ovalbumin has been detected in 59%-



Panel 1: Incubated with the patient's serum.

Panel 2: Incubated with the negative control serum.

**Figure.** IgE immunoblot assay with pistachio and cashew extracts. MW indicates molecular weight; P, pistachio extract; C, cashew extract.

74% of breast milk samples, cow's milk  $\beta$ -lactoglobulin in 53%–63% [2], and peanut proteins in about 48% [4]. The main allergens reported include ovomucoid [2],  $\alpha$ -S1-casein [5], and gliadin [3]. Pastor-Vargas et al [6] developed an antibody array capable of detecting 10 major food allergens in breast milk, thus demonstrating that a high number of the allergens studied were detected in most of the samples obtained. In the present case, despite the absence of mass spectrometry-based identification, the 55-kDa band detected could correspond to Pis v 3 (vicilin) and the 32 kDa band to Pis v 2 (legumin), both of which have already been described.

Eczema, colic, diarrhea, and vomiting are frequent symptoms in exclusively breastfed infants, although few cases of food allergy during exclusive breastfeeding have been reported.

Monti et al [7] described a case of anaphylaxis in a 4-month-old infant with atopic dermatitis after ingestion of breast milk. The mother had previously eaten trout. The infant had positive IgE against trout and turbot. González de Olano et al [8] reported a case of allergy after the first ingestion of garlic in a 9-month-old infant with no history of atopy. However, sensitization through breastfeeding could not be confirmed, because garlic allergens were not identified in breast milk.

Finally, Martin Muñoz et al [9] reported 5 infants who developed symptoms during breastfeeding in which the presence of specific IgE to allergens that had not been previously introduced in the diet (milk, egg, and peanut) was demonstrated. Once these foods were eliminated from the mother's diet, the children no longer experienced symptoms during breastfeeding.

We present a case of an immediate allergic reaction after breastfeeding due to pistachio allergy. Based on the clinical data and the results of the challenge with breast milk, we suggest the hypothesis of possible sensitization to pistachio via breast milk.

The negative SPPT result with PBM1h and PBM24h could be explained by the possibility that the sample did not contain enough allergen for a positive prick result but did contain enough allergen for a positive challenge result (PBM1h).

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### Conflicts of Interest

The authors declare that they have no conflicts of interest.

### References

- DesRoches A, Infante-Rivard C, Paradis L, Paradis J, Haddad E. Peanut allergy: is maternal transmission of antigens during pregnancy and breastfeeding a risk factor? *J Investig Allergol Clin Immunol*. 2010;20:289-94.
- Fukushima Y, Kawata Y, Onda T, Kitagawa M. Consumption of cow milk and egg by lactating women and the presence of B-lactoglobulin and ovalbumin in breast milk. *Am J Clin Nutr*. 1997;65:30-5.
- Troncone R, Scarcella A, Donatiello A, Cannataro P, Tarabuso A, Auricchio S. Passage of gliadin into human breast milk. *Acta Paediatr Scand*. 1987;76:453-6.
- Vadas P, Wai Y, Burks W, Perelman B. Detection of peanut allergens in breast milk of lactating women. *JAMA*. 2001;285:1746-8.
- Coscia A, Orrù S, Di Nicola P, Giuliani F, Rovelli I, Peila C, et al. Cow's milk proteins in human milk. *J Biol Regul Homeost Agents*. 2012;26:39-42.
- Pastor-Vargas C, Maroto AS, Díaz-Perales A, Villaba M, Casillas Diaz N, Vivanco F, et al. Sensitive detection of major food allergens in breast milk: first gateway for allergenic contact during breastfeeding. *Allergy*. 2015;70:1024-7.
- Monti G, Marinaro L, Libanore V, Peltran A, Muratore MC, Silvestro L. Anaphylaxis due to fish hypersensitivity in an exclusively breastfed infant. *Acta Paediatr*. 2006;95:1514-5.
- González-de-Olano D, Barra-Castro A, Riaño-Avanzini T, Pastor-Vargas C, Bartolomé B. Allergy to a Garlic Lectin in an Infant After the First Intake: Difficulties Identifying the Route of Sensitization. *J Investig Allergol Clin Immunol*. 2018;28:253-4.
- Martín-Muñoz MF, Pineda F, García Parrado G, Guillén D, Rivero D, Belver T, et al. Food allergy in breastfeeding babies. Hidden allergens in human milk. *Eur Ann Allergy Clin Immunol*. 2016;48:123-8.

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