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Usefulness of Component-Resolved Diagnosis of Pollen-Food Allergy Syndrome

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Dear Editor,

Pollen-food allergy syndrome (PFAS) is defined as the manifestation of oral hypersensitivity symptoms in individuals with pollen allergies upon consuming certain raw fruits, vegetables, peanuts, and tree nuts. This condition occurs because of cross-reactivity based on shared epitopes between the proteins present in these foods and the allergens found in pollen [1, 2]. Pathogen-related 10 (PR-10) proteins are the main allergens in *Fagales* pollen, with Bet v 1 being the most common. Mal d 1 (apple), Pru ar 1f (apricot), Pru p 1 (peach), Api g 1 (celery), Gly m 4 (soy), Ara h 8 (peanut), Cor a 1 (hazelnut), Cas s 1 (chestnut), and sola l 4 (tomato) are plant allergen proteins that share a sequence similarity with Bet v 1, frequently resulting in cross-sensitization and the subsequent development of PFAS [1].

Allergy is diagnosed on the basis of patient symptoms, skin prick tests screening a panel of respiratory and/or food allergens, and serum testing for allergen-specific IgEs [1]. We report the case of a patient with eosinophilic gastroenteritis linked to PFAS caused by sensitization to PR-10 protein in whom soy-specific IgE was detected by the allergen component ImmunoCAP test (Thermo Fisher Scientific, Uppsala, Sweden) but not the AlloScreen multiple allergen simultaneous test (MAST; LG Life Science, Seoul, Korea) or the whole-allergen ImmunoCAP test (Thermo Fisher Scientific). This study was reviewed and approved by the Institutional Review Board of Pusan National University Hospital (2309-010-130).

A 32-yr-old man with unresolved dyspepsia for the last four months despite protein pump inhibitor treatment was examined in February 2021. He was diagnosed as having eosinophilic gastroenteritis after upper gastrointestinal endoscopy and biopsy examinations. The patient's blood test results indicated a mildly elevated IgE level (133 IU/mL, reference range <100 IU/mL) and the absence of eosinophilia (0.45×10^9/L). During follow-up, upper gastrointestinal endoscopy revealed general mucosal edema (Fig. 1). The patient had developed a cutaneous rash and edema after consuming chilled soymilk noodle soup, had a history of allergic rhinitis, and complained of abdominal discomfort when eating peaches or apples.

Table 1 shows the specific IgE results obtained using the AlloScreen MAST and the ImmunoCAP whole-allergen test. The MAST detected specific IgEs for alder, apple, birch, and peach. However, the MAST and the ImmunoCAP whole-allergen assay did not detect specific IgEs for soy and wheat. Because of the discrepancy between the patient's response to soy and these

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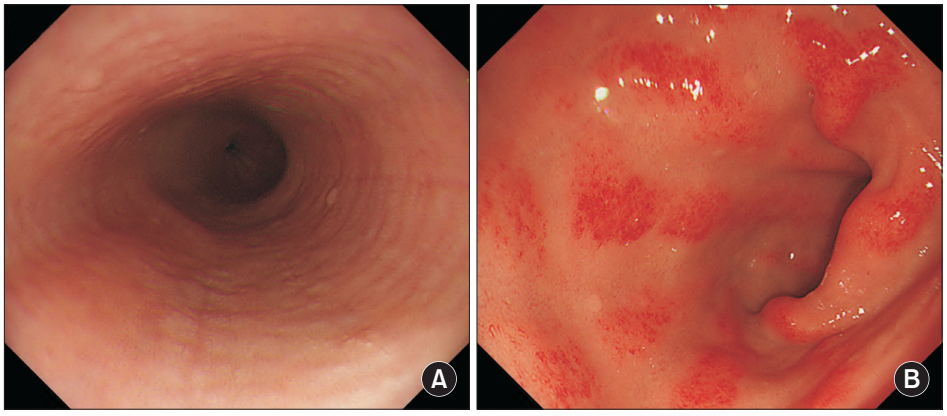

Fig. 1. Gastrointestinal endoscopy findings. (A) Multiple concentric rings, edema, and furrows in the mid-esophagus. (B) Mucosal edema and patchy erythema in the duodenal bulb.

Table 1. Specific IgE results obtained with the MAST and the ImmunoCAP

Test		Allergen (code)	Specific IgE (Class [kU/L])
Initial tests	MAST	Alder	Class 1
		Apple	Class 1
		Birch	Class 3
		Peach	Class 3
		Alternaria, anchovy, baker's yeast, banana, barley, beef, buckwheat, cacao, *Candida albicans*, cat, celery, cheese, chicken, clam, cockroach mix, codfish, cow's milk, crab, cucumber, dog, egg white, garlic, house dust, Japanese hop, kiwi, mackerel, maize, mango, mite-*Dermatophagoides farinae*, mite-*D. pterony*, mugwort, mushroom, mussel, onion, orange, peanut, pork, potato, pupal silk cocoon, rice, rye, salmon, sesame, short ragweed, shrimp, soybean, squid, sweet chestnut, tomato, tuna, walnut, wheat, white oak	Class 0
	ImmunoCAP (whole allergen)	Gal-alpha-1 (o215)	Class 0 (0.01)
		Gluten (f79)	Class 0 (0.00)
		Omega-5 gliadin, wheat (f416)	Class 0 (0.00)
		Soybean (f14)	Class 0 (0.09)
		Wheat (f4)	Class 0 (0.02)
Additional test	ImmunoCAP (allergen component)	rAra h 8, peanut (f352)	Class 3 (10.3)
		rBet v 1, birch (t215)	Class 3 (15.2)
		rGly m 4, soybean (f353)	Class 3 (11.3)
		rPru p 1, peach (f419)	Class 3 (11.9)

Abbreviation: MAST, multiple allergen simultaneous test.

initial test results, an additional component ImmunoCAP test was conducted to test for suspected PR-10. The component ImmunoCAP test detected specific IgEs for rAra h 8 of peanut, rBet v 1 of birch, rGly m 4 of soy, and rPru p 1 of peach.

In Korea, the prevalence of PFAS in patients with pollinosis is 41.7%, with soy being the causative food in 7.4% of patients [3]. PR-10 components are generally present in low amounts in native allergen extracts. Because they are often heat-labile, their concentration is further impacted by their breakdown during extraction [2]. Kosma *et al*. [4] reported four patients with either no or a very weak IgE response to soybean extract but a strong response to Gly m 4. Mittag *et al*. [5] reported that only 45% (10/22) of patients with pollen-related allergy to soybeans tested positive in a soy extract–based test, whereas 96% (21/22) showed IgE binding to rGly m 4. Therefore, for our patient, these other findings indicate the reason why a specific IgE for soy whole allergen was not found in both the MAST and the ImmunoCAP whole-allergen test, whereas the specific IgE for the

rGly m 4 allergen of soy was detected by the component ImmunoCAP test.

Although it is generally agreed upon that birch pollen–related food allergies typically result in mild allergic symptoms, a significant proportion of patients experience systemic symptoms [3]. In one study, PFAS was identified in 26% of patients with eosinophilic esophagitis [6]. However, only a few cases of eosinophilic gastroenteritis in patients with PFAS have been reported [7, 8]. Soybean allergens are known to induce systemic symptoms in individuals with PFAS, likely because of their intrinsic molecular stability [5]. Dietary powders or soy drinks contain high Gly m 4 levels [2]. The systemic symptoms in our patient deteriorated after he consumed chilled soymilk noodle soup. The patient had no eosinophilia. Patients with eosinophil-associated gastrointestinal disorders have increased tissue eosinophil counts; however, only some patients have increased peripheral blood eosinophil counts because eotaxin-1 levels in tissues are relatively higher than IL-5 levels [9].

Component-resolved diagnosis is not used extensively in Korea. Patients who are sensitized to birch pollen and manifest symptoms suggestive of soy allergy should be tested for specific IgEs to the rGly m 4 allergen if initial testing for specific IgEs to soy extract yields negative results. Component-resolved diagnostic test results will help in guiding patients to abstain from certain food items, facilitating the alleviation of symptoms.

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AUTHOR CONTRIBUTIONS

Shin KH analyzed the information and wrote the manuscript. Lee HJ revised the manuscript. Lee MW managed the patient and provided the clinical information. Moon S contributed to result interpretation and manuscript revision. All the authors have read and approved the final manuscript.

CONFLICTS OF INTEREST

None declared.

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