Egg Oral Immunotherapy With Dupilumab Premedication in an Adult Patient

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Food allergy to milk, eggs, and nuts is more frequent in children than in adults. Hypersensitivity to egg affects 0.5%-2.5% of children [1] and around 0.2% of adults [2]. Avoidance diet is the most effective way to prevent reactions in sensitized patients. However, reactions, which are sometimes severe, after accidental exposure are frequent owing to the presence of egg traces in many processed foods [3].

Allergic reactions to foods can be managed by achieving tolerance through oral immunotherapy (OIT). Various protocols have proven both successful and safe in children, although they are difficult to apply in adults owing to the higher incidence of severe symptoms during the dose-escalation phase [4].

In cases where OIT cannot be completed, biological treatments have been introduced as adjuvant therapies to minimize adverse effects and facilitate up-dosing [5]. Future studies should also aim to identify the optimal timing for intervention and the appropriate duration of treatment. The most widely used biological agent is omalizumab, an anti-IgE medication that has proven efficacious in OIT for children allergic to milk, egg, nuts, grains, and sesame [6,7], as well as in adults allergic to peanut and at least 2 other foods (including milk, egg, wheat, and nuts) [8]. Research on dupilumab and other biologics in food allergy treatment is ongoing, and further evidence is needed to define their long-term efficacy and clinical role [9,10].

We report the case of a 26-year-old woman with a medical history of rhinoconjunctivitis, severe atopic dermatitis, and poorly controlled severe asthma due to sensitization to mites and pollens. She also reported recurrent episodes of egg-induced anaphylaxis characterized by generalized urticaria, rhinitis, bronchospasm, hypotension, and vomiting, which occasionally required admission to the intensive care unit. Some episodes occurred following the ingestion of egg traces. No cofactors (eg, exercise, menstruation, or intake of nonsteroidal anti-inflammatory drugs) were involved. The patient gave her informed consent for the tests and publication of the case report along with all the accompanying visual elements.

An allergy work-up was performed based on skin prick tests with commercial extracts, yielding the following results: egg, 9×8 mm; egg white, 6×7 mm; egg yolk, 6×7 mm; ovalbumin, 5×7 mm; and ovomucoid, 8×6 mm. In vitro testing by ImmunoCAP (Thermo Fisher Scientific) revealed a total IgE level of 724 kU/L and the following specific IgE levels: egg white, 10.40 kU_A/L; egg yolk, 3.22 kU_A/L; combined egg white and yolk, 10.70 kU_A/L; ovalbumin (Gal d 2), 5.03 kU_A/L; ovomucoid (Gal d 1), 15.20 kU_A/L; and lysozyme (Gal d 4), 0.15 kU_A/L. Baseline tryptase was 2.9 µg/L.

The patient was diagnosed with asthma step 5 according to the Global Initiative for Asthma (GINA) classification. She was being treated with high-dose inhaled corticosteroids and long-acting ß-agonists, although her asthma was poorly controlled, with 2 exacerbations in the previous 4 months. At the follow-up visit, her asthma control scores were <15 in the Asthma Control Test and >1.5 in the Asthma Control Questionnaire.

The patient also had poorly controlled atopic dermatitis, which required several courses of oral corticosteroids in recent months. At the follow-up visit, disease activity scores were elevated, as follows: Scoring Atopic Dermatitis, 52; Eczema Area and Severity Index, 24; and Dermatology Life Quality Index, 21.

Given the poor control of both atopic comorbidities, treatment with dupilumab 300 mg every 2 weeks was initiated, resulting in significant clinical improvement in both conditions. After 4 months of dupilumab therapy, we attempted to initiate an OIT with egg using a protocol based on dehydrated egg white protein (Ovo-Des NM, Cantabria Labs) and weekly dose escalation (10-30-75-125-250-500-1000-2000 mg). This was followed by maintenance with egg white albumin (Ovo-Pro, Cantabria Labs) at 4000 mg, which was initially well tolerated.

However, on the second day of the 4000-mg maintenance dose, the patient developed generalized urticaria, and on the third day, she experienced an anaphylactic episode 90 minutes after consuming the dose. A possible cofactor identified for this reaction was the administration of the typhoid vaccine (Typhim, Sanofi Winthrop) 12 hours prior to the second 4000-mg dose. The vaccine contained purified Vi capsular polysaccharide from Salmonella typhi.

Table. Changes in Total and Specific IgE to Egg Proteins During the OIT Procedure.

In vitro results, IU/mL	August 2022 Before OIT and before dupilumab	December 2023 Before OIT and after dupilumab	March 2024 During OIT	April 2024 After 1 mo with 4 g Sermand
Total IgE, kU/L	724	275	179	176
Specific IgE, kU_A/L				
Egg (white)	10.40	3.27	1.94	2.64
Egg (yolk)	3.22	1.10	0.28	0.26
Egg (yolk and white)	10.70	6.28	2.10	2.18
Ovalbumin (Gal d 2)	5.03	2.46	0.64	0.48
Ovomucoid (Gal d 1)	15.20	4.42	2.75	3.15
Lysozyme (Gal d 4)	0.15	0.12	0.05	0.03
Conalbumin (Gal d 3)	0.03	0.01	0.01	0.01

Abbreviation: OIT, oral immunotherapy.

Following resolution of anaphylaxis, the daily dose was reduced to 2000 mg for 1 month and was well tolerated. It was subsequently increased to 4000 mg of Ovo-Pro without further incidents. Owing to a shortage of Ovo-Pro, the patient was transitioned to another commercial egg white albumin product (Sermand 4000 mg, Sermand Nutricion), which she continues to take and tolerate. The changes in total and specific IgE to egg proteins during the OIT procedure are summarized in the Table.

An oral provocation test with egg yolk performed after 8 months of dupilumab treatment was well tolerated. The patient currently tolerates up to 1 whole egg daily in various forms, including raw egg (eg, mayonnaise and meringue), omelet, and fried egg, with no allergic reactions. Expanding the diet significantly enhanced her quality of life. Given the patient's improved tolerance, she will be tapering off Sermand 4000 mg, which she has been taking for 10 months.

This is the first reported case of an adult with severe egg-induced anaphylaxis who achieved tolerance to egg through oral desensitization facilitated by dupilumab. The patient was receiving dupilumab for the treatment of severe atopic comorbidities (asthma and atopic dermatitis). Owing to the severity of recent allergic episodes, she had previously declined unadjuvanted OIT; therefore, we cannot determine how it would have progressed. However, the outcome in this case suggests that dupilumab may have facilitated successful desensitization and could be a useful adjuvant therapy when OIT proves challenging. Further research is needed to clarify the role of dupilumab in the management of food allergy, validate its efficacy, and identify the patients most likely to benefit from its use in OIT protocols.

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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