

Letter to the Editor

Consumption of heat-treated egg by children allergic or sensitized to egg can affect the natural course of egg allergy: Hypothesis-generating observations

To the Editor:

Allergy to hen's egg is one of the most frequent food allergies in infants. The majority of egg allergy is outgrown by the school-age years.¹ Until then, management consists of an elimination diet; however, risk of accidental ingestion remains. Therefore there are current attempts to either treat egg allergy with immunotherapy or induce oral tolerance.^{2,3}

Certain hen's egg allergens are heat labile, making it possible for some of the allergic children to consume small amounts of egg in baked foods.^{4,5} Introduction of baked egg mixtures in children with allergy to egg can prove useful in practical terms for participation of the child in social activities. Having used this approach in our clinic for several years, we came to hypothesize that such a process can affect the natural history of egg allergy, accelerating the development of tolerance. We describe evidence leading to this hypothesis.

Among patients referred to the food allergy unit of our department, 94 (57 boys and 37 girls; median age, 24 months; age range, 12-48 months) were retrospectively evaluated. These included 55 children with a diagnosis of allergy to hen's egg (by means of positive challenge result, convincing history combined with positive specific IgE level, or both) and 39 sensitized to hen's egg (with positive skin prick tests [SPTs] to egg white, egg white-specific IgE [IgE_{f1}]), or both, usually performed in the context of atopy evaluation) without previous hen's egg ingestion. The majority of children with egg allergy (67%) and 100% of the sensitized group had atopic eczema (AE). A detailed medical history, SPTs, and specific IgE measurements (CAP FEIA) were available for all children.

Children were challenged with increasing quantities of a cake baked with 1 egg. A starting dose of 0.1 g of cake (containing 0.63 mg of total egg protein) was gradually increased (tripling the previous dose) up to 10 g. Negative challenge results were followed by instructions of continuing consumption with a slow and gradual increase of the egg content of the cake to a total quantity of 1.5 g of total egg protein contained in a small piece of cake by using a recipe provided by our dietician. An open challenge to egg was performed 6 months later until the time when a piece of cake was administered daily.

More than 90% of subjects could tolerate baked egg in a cake (92.7% of children with egg allergy and 92.3% of sensitized children, Table I). Positive challenge results to baked egg presented with urticaria (n = 4), AE flare-up (n = 1), and anaphylaxis (n = 2). There was no significant difference in specific IgE measures (SPT or CAP) between those with positive and negative challenge results in either group. Among children with egg allergy who tolerated baked egg, there were 15 (27.3%) patients with CAP levels of greater than 6 IU/mL, which is the proposed 95% decision point for a positive challenge (median IgE_{f1}, 16.2 IU/mL; range, 7.34-76.5 IU/mL).⁶

After a period of 6 months, 87 children who were freely receiving baked egg underwent open food challenges to whole

TABLE I. Outcome of oral challenges to baked egg and specific IgE_{f1} to children allergic to or sensitized to egg

	Age (mo)	Challenge outcome					
		Negative			Positive		
		No. of patients	IgE _{f1} (IU/mL)	SPTs (mm)	Patients	IgE _{f1} (IU/mL)	SPTs (mm)
Allergic	24 (9)	51	3 (13.42)	7 (3.5)	4	2.28 (3.83)	4 (5)
Sensitized	24 (18)	36	4.62 (8.04)	7 (4)	3	7.19 (9.9)	8 (2)

Descriptive statistics are presented as medians (interquartile ranges). SPT and IgE values did not significantly differ between groups (negative vs positive challenges and allergic vs sensitized cases; Mann-Whitney U test, $P > .250$).

egg. Only 4 (4.6%) of them had positive challenges (AE flare-up, n = 1; urticaria, n = 3). Specific IgE levels for these patients ranged from 2.29 to 3.94 IU/mL, whereas all patients with IgE_{f1} levels of greater than 4.62 IU/mL (67 patients) could now tolerate egg. All patients were prospectively followed up to confirm they had outgrown their allergy to egg.

Although appropriate controls were not included, it is noteworthy that the observed percentage of persistence of egg allergy is considerably low in comparison with that described in the literature (ie, 40% or 27% of children with convincing or suggestive history, respectively, at similar time points).⁶ Therefore the possibility that small quantities of processed antigen consumption in the form of baked egg might alter the natural course of the disease cannot be excluded. A controlled study to evaluate this hypothesis is underway.

Furthermore, our data suggest that decision points for challenges to egg⁷ can be affected by consumption of products that contain small quantities of egg protein in processed form. Taking into account that such products are widely available and not always avoided by patients, either because of lack of compliance or unclear and insufficient labelling,⁸ it might be of importance to seek such consumption history in detail when reassessing patients with allergy or sensitization to egg.

Finally, it should be pointed out that severe reactions can occur even to heat-treated egg in children with AE who are sensitized but have not previously consumed egg, as in the case of egg challenges.⁹ Therefore caution should be applied in the introduction of egg in any form in such cases.

In conclusion, absolute levels of egg-specific serum IgE levels are not able to predict the challenge outcome in children with egg allergy or sensitization consuming small quantities of egg in baked form. The hypothesis that such consumption might affect the natural course of allergy to egg should be evaluated in controlled trials.

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