

# Egg introduction: differential allergic responses

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**Abstract:** The use of egg protein preparations in clinical trials to reduce the incidence of egg allergy among infants includes a number of preparations of egg. These include whole egg, egg white protein, and egg yolk preparations. The study of the differential immune responses to these allergenic proteins in comparison is suggested as a future research area of investigation.

**Keywords:** food allergy, egg allergy, clinical trial, atopy

## Introduction

Hen's egg allergy is a common early-life food allergy. There are divergent results of early egg introduction on the subsequent development of egg sensitization, as noted in the JAMA article by Ierodiakonou et al.<sup>1</sup> In their meta-analysis of five trials with 1915 participants, the study showed that the egg introduction between 4 and 6 months of age was associated with a lower risk of egg allergy compared to later introduction (relative risk [RR]=0.56,  $p=0.009$ ). In contrast though, four trials with 1786 participants showed no association between timing of egg introduction and egg sensitization.<sup>1</sup> Sensitization and development of allergy are separate conditions.

One of the difficulties in the interpretation of egg introduction studies may be the form of the egg protein itself. There are studies utilizing egg yolk, egg white, and whole egg powder. Each is a distinct form of egg with its own allergenic properties.

## Discussion

One of the first clinical studies of egg introduction introduced egg yolk to infants either before 3 weeks of age or after 6 months of age.<sup>2</sup> The authors reported in both groups that infants developed allergic disease and that respiratory symptoms were common (6/13). The study was conducted without the benefit of modern allergy testing methods. Recently, two studies of egg introduction highlight that further study is needed to identify whether a subset of infants may benefit from early introduction of egg protein and whether the form of egg impacts the development of allergic disease.

A study by Bellach et al found no evidence that egg white powder (Vernum) introduced at 4–6 months of age prevents hen's egg sensitization or allergy.<sup>3</sup> The authors report that among infants screened for the study, 16 were identified to already have responses to egg food challenge and that among these infants, 10 had anaphylactic reactions involving two organ systems. Four of the 16 infants had involvement of the respiratory or cardiovascular systems. Among the 383 infants not sensitized at 4–6

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months of age, 184 received Venum. At 12 months of life, 5.6% in the early introduction group and 2.6% in the placebo group demonstrated egg sensitization ( $p=0.24$ ). This study showed that egg white powder used in early introduction did not significantly modify sensitization at 12 months of age.

In a study of 319 infants, randomized to receive whole egg powder ( $n=165$ ) between 4 and 6 months of age, there were fewer infants with egg white sensitization among the early introduction group (11%) versus control group (20%,  $p<0.0001$ ). In this study, 14 infants reacted to egg within 1 week of early introduction, despite a negative egg white skin test.<sup>4</sup> In this study, whole egg powder was effective in reducing the sensitization to egg white at 12 months of age.

## Conclusion

A subset of infants in the early introduction group or during food challenge screening will develop a clinical reaction. There are divergent results available regarding the usefulness

of early egg introduction, but more studies comparing egg white, egg yolk, and whole egg powder may yield further insight on the potential modification of allergic responses to hen's egg.

## Disclosure

The author reports no conflicts of interest in this work.

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