Published in final edited form as:

Clin Exp Allergy. 2013 October ; 43(10): 1095–1096. doi:10.1111/cea.12183.

Turning Up the Heat on Skin Testing for Baked Egg Allergy

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Egg allergy is one of the most common causes of pediatric food allergy [1–3]. Egg is an important source of nutrition and commonly found in commercial food products such as baked goods. Strict avoidance of egg can impair quality of life by limiting the number of allowed foods and making social events involving food potentially dangerous, stressful and isolating. Although most children eventually tolerate egg, children are outgrowing their egg allergies later than previously reported [4]. Recent studies suggest that most egg-allergic children may tolerate baked egg products [5–9]. Identification of predictable markers to identify these patients has high potential to aid physicians in clinical management of egg allergy.

The prospective study by Tan et al. [10] published in this issue of the Journal investigates the role of skin prick testing (SPT) to ovomucoid and a baked egg muffin in predicting outcomes of baked egg challenges. The authors found that SPT measurements to egg white, ovomucoid and baked egg were significantly larger in those who failed baked egg challenges, compared to those who passed. Their results regarding egg white SPT are in agreement with previously reported data [7–9, 11]. The findings that ovomucoid and baked egg SPT may be useful in predicting baked egg challenge outcome are novel. Ovomucoid, the dominant allergen in egg white, is relatively stable to thermal processing and proteolysis, which may explain its importance as an allergen [12]. As such, several studies have also demonstrated the potential importance of immune response to ovomucoid in predicting baked egg tolerance [8, 11, 13–15], but its true utility is controversial. We have recently shown that while ovomucoid specific IgE (sIgE) predicts outcomes of baked egg challenges, it is not superior to egg white sIgE or SPT, which remain useful predictors of baked egg tolerance [9].

Baking exposes proteins to high temperatures, which may reduce allergenicity by destroying conformational epitopes. In addition, allergenicity may be decreased by blocking epitope access through interaction with other food proteins, such as in a wheat matrix in a baked muffin [16]. There is presently no diagnostic test available to assess immune response to the egg proteins in a wheat complex, which represents a significant knowledge gap in current clinical practice. The utility of SPT to baked egg has been investigated in a small retrospective study and a negative SPT to baked egg was found to predict passing a baked egg challenge, but predictive values of positive SPTs were not further explored [17].

SPT can be performed quickly and inexpensively, making this test available to many practicing allergists. Unfortunately, ovomucoid SPT extract is not currently commercially available in certain countries such as the United States. SPT to fresh muffin may best reflect the degree of egg protein modification that a patient is exposed to in a baked egg challenge.

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Therefore, SPT to baked egg may prove to be an important predictor of baked egg challenge outcome. SPT to the fresh baked good may also be useful in identifying children who may be tolerant to heated but even less well-baked forms of egg. SPT to brownies, meatballs, pancakes or even gooey cookies may be on the horizon of allergy testing.

This study is limited in several aspects that suggest the need for future studies. Egg allergy was defined based on history of reported reaction to egg and/or positive testing, rather than a formal physician-observed food challenge, and not all children had a history of reactions to egg. Food challenges to investigate whether the children who passed baked egg challenges could also consume unheated egg were not done. Since baked egg SPT was done by creating a homogenate of the muffin, it is possible that concentrations and modifications of egg proteins may vary depending on what portion of the muffin was sampled (e.g., crust versus inner layer). Direct comparisons between other existing SPT and sIgE tests were not done to analyse whether one test was superior. So, while potentially useful, ovomucoid and baked egg SPT should not replace other existing testing methods.

Nevertheless, this study adds to the growing body of literature aimed at identifying predictors of baked egg challenge outcomes. SPT to baked egg and ovomucoid are novel and potentially useful ways to rapidly and inexpensively identify children who may pass a baked egg challenge. The utility of baked egg and ovomucoid SPT needs to be evaluated further before recommending these tests for the diagnosis of baked egg allergy in clinical practice.

Acknowledgments

Funding: This work was supported in part by NIH grants K24 AI 106822

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