

Clinical reactivity and biomarkers of milk- and egg-allergic patients tolerating baked forms of milk and egg.

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Background: Milk and egg allergies are among the most common food allergies in children. About 70% of milk- and egg-allergic children are able to tolerate baked forms of milk and egg, such as in a muffin, due to denaturation of the proteins by heat and interactions with a food matrix. Studies have indicated that children who are able to include baked milk and egg products in their diets are more likely to outgrow their allergy. These findings indicate that baked milk and egg may act as a form of immunotherapy. **Objectives:** The main purpose of our study is to investigate if the addition of progressively less-baked milk and egg will help patients outgrow their milk or egg allergy sooner. In addition, we are studying the ability of standard allergy testing and mechanistic studies to predict clinical reactivity to baked milk and egg, as well as persistence of allergy. **Methods:** Subjects and controls are egg- and milk-allergic patients with a history of an allergic reaction to egg and/or milk AND positive testing, OR no history of clinical reactivity but testing suggestive of > 95% likelihood of allergy. Subjects are challenged at a minimum of every 3 months to progressively less-baked milk products (muffin, then baked cheese pizza, then custard) and egg products (muffin, then meatball, then frittata), and offered regular milk and egg challenges when testing is favorable. Standard skin prick testing (SPT) and specific IgE (sIgE) levels are monitored throughout the study. *In vitro* basophil activation tests (BATs) and immunoblotting to extracts of the different baked forms are performed to assess for usefulness as biomarkers. **Results:** Eight milk-allergic, nine egg allergic patients, and 16 controls have been recruited. Baseline data and reactivity to baked milk and egg have been collected. Subjects tolerant to baked milk or egg muffin tended to have lower SPT and IgE levels at baseline. Results from both immunoblotting and BATs showed high variability of IgE binding between the different baked extracts and correlate with clinical reactivity. Interestingly, in most patients, less-baked extracts (custard and frittata) were associated with lower IgE reactivity than the most-baked forms of extract (milk and egg muffin). So far, two milk-allergic subjects have advanced from muffin to baked cheese pizza, and one egg-allergic subject has advanced from muffin through frittata and is now tolerating regular egg. **Conclusions:** Of patients able to tolerate baked egg and milk muffin, prognosis appears good in that they are able to progress through less-baked milk and egg and eventually tolerate regular milk and egg. Immunoblotting and BATs indicate a loss of IgE recognition and decreased reactivity towards differently baked forms of milk and egg, making them potential candidates as biomarkers. Mechanistic studies are also showing that forms of baked milk and egg that were thought to be more allergenic may actually be less, thus potentially changing our dietary recommendations for milk- and egg-allergic patients.