Position Statement for Healthcare Professionals

Egg Allergy

Updated May 2017

Prevalence of Egg Allergy in Australia

In Australia, food allergy affects one in ten young children, with cow's milk, eggs and nuts the most common food allergens[1]. Raw egg allergy is very common, estimated to affect approximately 8.9% of 1 year old children, however many of these children can tolerate baked egg in their diets[1]. By 4 years of age, however, the prevalence of challenge-confirmed egg allergy was just 1.2% in the same cohort[2].

Most egg allergy reactions occur in children between the ages of 6 and 15 months when egg is given for the first time. Fortunately, tolerance to egg usually develops between the ages of 3 and 4 years[1] resulting in many children being able to eat eggs as they get older. It has been estimated that approximately 85% of children outgrow IgE mediated food allergies, especially those to cow's milk and egg[3]. Australian data from the HealthNuts cohort study of 5276 Australian infants found that in 47% of infants with egg allergy, egg allergy resolved by 2 years of age[4]. Furthermore, infants who could tolerate baked egg at 12 months of age were more likely to have their allergy resolve by 2 years of age[5].

Symptoms of Egg Allergy

Egg allergy may be IgE-mediated or non-IgE mediated[6,7]. IgE-mediated reactions to egg are predominantly immediate reactions characterised by urticaria, angioedema, vomiting, diarrhoea and wheeze. Symptoms usually occur within 30 minutes or less of egg contact but may be delayed for 1–2 hours in a minority of cases [6]. While cases of anaphylaxis to egg have been reported, this type of reaction is less common compared to peanut[8] and milk[9]. Egg proteins are also being increasingly recognised as a trigger for non-IgE mediated gastrointestinal allergies[7]. These gastrointestinal disorders are typically delayed in presentation after ingestion of the allergen, and include food protein induced enterocolitis syndrome (FPIES), food-protein induced enteropathy or food protein induced allergic proctocolitis. An Australia-wide survey, published in 2017, found the incidence of FPIES in Australian infants (<24 months) was 15.4/100,000/year[10].

Allergens in Egg

Eggs are composed of many different individual proteins in both the egg white and the yolk. Six major egg allergens have been identified. Four of these are in the egg white and most children with an egg allergy react to these proteins. Less commonly children react to egg yolk allergens[11,12].

Common cooking processes, including heating, the addition of acid (such as lemon/lime juice or vinegar) and mixing can affect the allergenicity of proteins in foods[13]. The differences in allergenicity are caused by disruption of the protein structure affecting the antibody binding sites. In addition, heating egg protein with wheat (for example in a cake) forms a matrix with the wheat protein, altering the digestibility of the egg protein[14], and provides an explanation for why children who react to raw egg may tolerate cooked egg and baked products containing egg[1,15].

Egg Allergy in At-Risk Children

Both genetic and environmental factors are likely to be responsible for the development of an allergy. The rapid increase over the past 20 years in incidence of food allergy and in variety of foods causing allergic reactions imply changing environmental influences on gene expression are probably the underlying cause of these recent trends[16].

Factors increasing the risk of IgE mediated food allergy, including egg allergy:

- Family history of allergies or asthma[17]
- History of allergic disease in an immediate family member and having parents born in East Asia

Factors decreasing the risk of IgE mediated food allergy, including egg allergy:

- Children with older siblings and those with a pet dog at home were less likely to develop egg allergy by 1 year of age[18]
- Earlier introduction of egg into the infants' diet as well as sufficient vitamin D levels[5]

Eczema is a risk factor for development of food allergy in infants, and young children with eczema are at greater risk of sensitisation to egg than a child without eczema before the first known ingestion[19]. In the Australian STAR study one third of babies with eczema were sensitised to egg prior to having ever eaten egg indicating that early life events probably also play a role in development of egg allergy[20].

Oral immunotherapy (OIT)

Oral immunotherapy (OIT), involves exposing individuals with egg allergy to small amounts of egg allergen over time. OIT is based on the hypothesis that exposing the immune system to small amounts of allergic protein over time helps build tolerance to the allergen in question, in effect 'switching off' the allergy. While evidence is building which suggests this process may help children out grow their allergy[21-23], OIT carries a risk of adverse effects and therefore requires strict medical supervision. At this time, immunotherapy to switch off food allergy is the subject of research, but is yet to enter routine clinical practice. Those who have a diagnosed food allergy should continue to avoid the food trigger unless they are participating in a research study lead by a clinical immunology/allergy specialist[24].

Baked Egg and Tolerance

The Australian HealthNuts study also reported that in infants who could tolerate baked egg at age 1 year, frequent ingestion of baked egg (≥5 times per month) compared with infrequent ingestion (0-4 times per month) increased the likelihood of tolerance to other forms of egg[4].

Consumption of baked egg, when tolerated is associated with improved quality of life scores [25], and as such it is reasonable to consider including baked egg, when tolerated, in the diet of egg allergic children. Any challenges to baked egg should only be carried out when recommended by a medical specialist.

Clinical Threshold for Reactions to Egg in Individuals with Egg Allergy

The amount of a food protein required to induce an allergic reaction is very important, as fatal accidents from trace amounts of food have been reported. Research published in 2013 found that the protein dose at which 5% of the allergic population is likely to respond with objective reactions is 1.5mg egg protein[26].

Current recommendations for inclusion of egg in infant diets

Avoidance of Allergens During Pregnancy and Breastfeeding

Research does not support restriction of common allergenic foods (including peanut, egg, fish, soy and cow's milk) during pregnancy and breastfeeding as a strategy for reducing the development of childhood allergies[27]. The Australian Society of Clinical Immunology and Allergy (ASCIA) infant feeding advice [28]states that *"exclusion of any particular foods (including foods considered to be highly allergenic) from the maternal diet during pregnancy or breastfeeding is not recommended, as this has not been shown to prevent allergies"*.

Eggs can therefore be included in the diet of pregnant and breastfeeding women as long as they are tolerated by the mother.

Introducing allergenic solid foods including eggs into the infant's diet

Eggs are a good source of protein, iron and essential fatty acids and are nutritious foods to include in the diets of infants[29]. Previously, it had been suggested that for high-risk infants, eggs should be avoided at least for the first 12 months of life to prevent development of allergy[30]. However, current evidence suggests that introduction of egg into the child's diet before 12 months of age helps to develop tolerance to egg, even in infants who are at high risk of developing food allergies[20].

The 2016 ASCIA Infant feeding and allergy prevention guidelines recommends that *"All infants should be given allergenic solid foods including peanut butter, cooked egg and dairy and wheat products in the first year of life. This includes infants at high risk of allergy"* [28].

When infants are ready, at around 6 months, but not before 4 months, a variety of solid foods should be introduced, starting with iron rich foods. At this stage, foods can be introduced according to what the family usually eats, regardless of whether the food is considered to be a common food allergen.

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In summary, the following recommendations regarding egg allergy can be made:

Infant Feeding advice for prevention of egg allergy:

- Recommendations are the same for all infants regardless of their family history of allergic diseases.
- Restricting the mother's egg intake during pregnancy and breast-feeding is not recommended.
- Breastfeeding is recommended for at least 6 months.
- Solid foods should be introduced at around 6 months, but not before 4 months.
- Whole egg (along with other allergenic solid foods) should be introduced in the first year of life.

For children with egg allergy:

- Egg is a common allergen, and may cause immediate IgE mediated allergies, and delayed non-IgE mediated allergies.
- Most children outgrow their egg allergy before they start school, but a small number will still have their egg allergy in primary and high school.
- The only treatment for egg allergy is complete avoidance of egg. Many children with raw egg allergy will tolerate baked egg, and the timing of a baked egg challenge should be discussed with their allergist.

<u>This statement is for healthcare professionals only.</u>

Useful Links

www.allergy.org.au
www.allergy.org.au/images/pcc/ASCIA_guidelines_infant_feeding_and_allergy_prevention.pdf
www.allergyfacts.org.au

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