



Position Statement for Healthcare Professionals

Eggs and Allergies

Updated July 2012

Prevalence of Egg Allergy in Australia

In Australia, cow's milk, eggs and nuts cause most of the food allergies in infants and children¹. Eighty per cent of food allergies in children are caused by these three allergens². Recent Australian data indicates that the prevalence of raw egg allergy in infants aged 1-year is approximately 8.9%¹.

Most egg allergy reactions occur in children between the ages of 6 and 15 months when egg is given for the first time. Fortunately, egg tolerance often develops between the ages of 3 and 4 years¹ resulting in many children being able to eat eggs as they get older. It has been estimated that approximately 85% of children outgrow food related allergies, especially those to cow's milk and egg³, though research from the John's Hopkins Children's Centre suggests that in a highly atopic population, milk and egg allergies may be more persistent and harder to outgrow than previously thought. A review in 2007 of 881 egg allergy sufferers showed the number of children who outgrow egg allergy increases with increasing age. Four percent outgrew this allergy by age 4, 37 percent by age 10, and 68 percent by age 16⁴.

New evidence suggests it might be possible to reduce the time it takes children to grow out of their allergy. More than 95% of egg-allergic preschool children who were exposed to small amounts of cooked egg in cake each day for six months tolerated egg when challenged. It is however unclear if these children would have naturally grown out of their allergy during the study, indicating further research is required in this area⁵. Another study has shown that children may outgrow allergy to well-cooked egg approximately twice as fast as they outgrow allergy to uncooked egg indicating that initiating the reintroduction of well-cooked egg from 2 to 3 years of age in children with previous mild reactions and no asthma may be worthwhile⁶.

Symptoms of Egg Allergy

Clinical reactions to egg are predominantly IgE-mediated 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 cases⁷. Severe life-threatening events and fatal anaphylaxis to egg in children are less common than to peanut and milk⁸.

Allergens in Egg

Egg white is considered to be the most frequent source of allergens and most children with an allergy react to the proteins in egg whites, though in some rare cases reactions to egg yolk have also been reported⁹. Reactions can occur to both cooked and raw egg whites¹⁰. Heating and gastric pH reduces the allergenicity of several egg white proteins¹¹, which provides an explanation for children who react to raw but not cooked egg and egg products^{1,12}.



Prevention of 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 as the underlying cause of these recent trends¹³. Exactly what these environmental influences are has not been determined. At present, family history of all immediate family with allergies or asthma is the only viable method to classify children as 'at risk'¹⁴.

Avoidance of Allergens During Pregnancy

The Australian Society of Clinical Immunology and Allergy (ASCIA) does not recommend restricting the mother's diet during pregnancy in order to eliminate 'allergenic foods' (including peanut, egg, fish, soy and cows milk) as research does not support this as a strategy for reducing the development of allergenic diseases¹⁵. Eggs can therefore be included in the diet of pregnant women as long as they are tolerated by the mother.

Avoidance of Allergens During Breastfeeding and Infancy

Maternal avoidance of allergenic foods during pregnancy has no beneficial effect on the incidence of food allergy or of atopic eczema to age 18 months. Of concern, restricted diets during pregnancy are associated with lower mean gestational weight gain¹⁶. ASCIA does not recommend maternal dietary restrictions during pregnancy or breastfeeding as a preventative measure, and suggests breastfeeding for at least the first 4-6 months in children at risk of allergic disease^{15,17}. Avoidance, by breastfeeding women, of cow's milk, egg and fish does not protect against infant food allergy¹⁸⁻²⁰.

Previously, it has been suggested that for high-risk infants, eggs should be avoided at least for the first 12 months of life²¹. However ASCIA recognise there is no evidence that dietary restrictions after 6 months of age have any additional benefits¹⁵. This conclusion is also supported by the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN), whose 2008 Complementary Feeding position paper concludes "there is no convincing scientific evidence that avoidance or delayed introduction of potentially allergenic foods, such as eggs, reduces allergies, either in infants considered at increased risk for the development of allergy or in those not considered to be at increased risk"²². A recent study found the introduction of egg (as well as other common allergens) before 6 months of age was not significantly associated with eczema or asthma²³. Furthermore, some studies have also shown that delayed introduction of solids, for example milk introduced after 6 months or egg introduced after 8 month of age, can increase the risk of developing atopic disease^{22,24}. In infants with atopic eczema there may be some reduction in symptoms in those with suspected egg allergy (who have positive specific IgE to eggs in their blood) by adopting an egg-free diet²⁵.

Introduction of Eggs to Non-allergic Children

In Australia, dietary guidelines recommend the introduction of solid foods at the age of approximately 6 months, beginning with the introduction of iron-enriched infant cereals. Vegetables, fruits, meats, poultry and fish are then added gradually²⁶. Egg yolks are suggested as an example of a food that infants of age 8-12 months can consume²⁶. There are no recommendations for the introduction of egg whites to the diet but it may be inferred that they be introduced after the age of 12 months. The dietary guidelines emphasise that introduced foods should be of high nutrient density and that first foods introduced should be soft and smooth textured. Eggs are highly appropriate for consumption at this stage of development being protein-rich, energy dense and of smooth texture.



Clinical Threshold for Eggs

The amount of food required to induce a clinical reaction is very important, as fatal accidents from trace amounts of food have been reported. In a study examining thresholds of clinical reactivity to egg, it was identified that 16% of individuals with egg allergies reacted to 65mg of egg as a solid food (equivalent to 6.5mg of egg protein). It was found that 0.8% of individuals with egg allergies reacted to 10mg or less of solid food and that the lowest reactive threshold was observed at less than 2mg of egg²⁷.

Eggs, Asthma

Evidence is beginning to emerge that, in some individuals, food allergens may play a role in the development of allergic diseases such as some forms of asthma. Studies to date indicate that eggs may be one of the more common foods to which people with asthma are sensitive²⁸. However, further research is warranted before any conclusions can be drawn.

In summary, the following recommendations for eggs and allergy can be made:

Infants with a family history of allergic diseases

- During pregnancy and lactation, restricting the mother's egg intake is not necessary.
- Breastfeeding is recommended for at least the first 4-6 months.

Infants without a family history of allergic diseases

- The Australian Dietary Guidelines for Children and Adolescents include the suggestion that egg yolk be introduced from 8 months of age²⁶. This is a suggestion only with research showing egg yolk can be well tolerated by infants from 6 months of age²⁹.
- There are no specific guidelines for the introduction of egg white however it is generally recommended from 9-12 months of age.

This statement is for healthcare professionals only.

Useful Links

www.allergy.org.au

www.allergyfacts.org.au

www.cs.nsw.gov.au/rpa/allergy/default.htm



References:

1. Osborne, N., *et al.* HealthNuts Investigators Prevalence of challenge-proven IgE-mediated food allergy using population-based sampling and predetermined challenge criteria in infants. . *J. Allergy Clin. Immunol.* **127**, 668-672 (2011).
2. Burks, W., Helm, R., Stanley, S. & Bannon, G.A. Food allergens. *Curr Opin Allergy Clin Immunol* **1**, 243-248 (2001).
3. Thong, B.Y. & Hourihane, J.O. Monitoring of IgE-mediated food allergy in childhood. *Acta Paediatr* **93**, 759-764 (2004).
4. Savage, J.H., Matsui, E.C., Skripak, J.M. & Wood, R.A. The natural history of egg allergy. *J Allergy Clin Immunol* **120**, 1413-1417 (2007).
5. Konstantinou, G.N., *et al.* Consumption of heat-treated egg by children allergic or sensitized to egg can affect the natural course of egg allergy: hypothesis-generating observations. *J Allergy Clin Immunol* **122**, 414-415 (2008).
6. Clark, A., *et al.* A longitudinal study of resolution of allergy to well-cooked and uncooked egg. *Clinical & Experimental Allergy* **41**, 706-712 (2011).
7. Boyano-Martinez, T., Garcia-Ara, C., Diaz-Pena, J.M. & Martin-Esteban, M. Prediction of tolerance on the basis of quantification of egg white-specific IgE antibodies in children with egg allergy. *J Allergy Clin Immunol* **110**, 304-309 (2002).
8. Allen, C.W., Campbell, D.E. & Kemp, A.S. Egg allergy: Are all childhood food allergies the same? *J Paediatr Child Health* **43**, 214-218 (2007).
9. Poulsen, L.K., *et al.* Allergens from fish and egg. *Allergy* **56 Suppl 67**, 39-42 (2001).
10. Eigenmann, P.A. Anaphylactic reactions to raw eggs after negative challenges with cooked eggs. *J Allergy Clin Immunol* **105**, 587-588 (2000).
11. Mine, Y. & Zhang, J.W. Comparative studies on antigenicity and allergenicity of native and denatured egg white proteins. *J Agric Food Chem* **50**, 2679-2683 (2002).
12. Romeira, A.M., *et al.* Egg allergy--to be or not to be boiled. *Allergy* **58**, 533-534 (2003).
13. Rudders, S.A., Banerji, A., Vassallo, M.F., Clark, S. & Camargo, C.A., Jr. Trends in pediatric emergency department visits for food-induced anaphylaxis. *J Allergy Clin Immunol* **126**, 385-388 (2010).
14. Prescott, S.L. & Tang, M.L. The Australasian Society of Clinical Immunology and Allergy position statement: Summary of allergy prevention in children. *Med J Aust* **182**, 464-467 (2005).
15. Prescott, S.L. & Tang, M. Allergy Prevention in Children. Vol. 2004 Information Bulletins (Australasian Society of Clinical Immunology and Allergy, Sydney, 2004).
16. Kramer, M.S. & Kakuma, R. Maternal dietary antigen avoidance during pregnancy and/or lactation for preventing or treating atopic disease in the child. *Cochrane Database Syst Rev*, CD000133 (2006).
17. Australasian Society of Clinical Immunology and Allergy. Infant Feeding Advice. (Australasian Society of Clinical Immunology and Allergy, 2008).
18. Du Toit, G. & Lack, G. Can food allergy be prevented? The current evidence. *Pediatr Clin North Am* **58**, 481-509, xii (2011).
19. Hattevig, G., *et al.* The effect of maternal avoidance of eggs, cow's milk, and fish during lactation on the development of IgE, IgG, and IgA antibodies in infants. *J Allergy Clin Immunol* **85**, 108-115 (1990).
20. Herrmann, M.E., *et al.* Prospective study of the atopy preventive effect of maternal avoidance of milk and eggs during pregnancy and lactation. *Eur J Pediatr* **155**, 770-774 (1996).



21. Arshad, S.H. Food allergen avoidance in primary prevention of food allergy. *Allergy* **56 Suppl 67**, 113-116 (2001).
22. Agostoni, C., *et al.* Complementary feeding: a commentary by the ESPGHAN Committee on Nutrition. *J Pediatr Gastroenterol Nutr* **46**, 99-110 (2008).
23. Tromp, II, *et al.* The introduction of allergenic foods and the development of reported wheezing and eczema in childhood: the Generation R study. *Arch Pediatr Adolesc Med* **165**, 933-938 (2011).
24. Zutavern, A., *et al.* The introduction of solids in relation to asthma and eczema. *Arch Dis Child* **89**, 303-308 (2004).
25. Bath-Hextall, F., Delamere, F. & Williams, H. Dietary exclusions for established atopic eczema. 36 (The Cochrane Library 2008, Issue 2, 2008).
26. National Health and Medical Research Council. Dietary Guidelines for Children and Adolescents in Australia. (Commonwealth Department of Health and Ageing, Canberra, 2003).
27. Morisset, M., *et al.* Thresholds of clinical reactivity to milk, egg, peanut and sesame in immunoglobulin E-dependent allergies: evaluation by double-blind or single-blind placebo-controlled oral challenges. *Clin Exp Allergy* **33**, 1046-1051 (2003).
28. Stanaland, B.E. Therapeutic measures for prevention of allergic rhinitis/asthma development. *Allergy Asthma Proc* **25**, 11-15 (2004).
29. Makrides, M., Hawkes, J.S., Neumann, M.A. & Gibson, R.A. Nutritional effect of including egg yolk in the weaning diet of breast-fed and formula-fed infants: a randomized controlled trial. *Am J Clin Nutr* **75**, 1084-1092 (2002).