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**The effect of egg ingestion on ovalbumin concentration
in human milk.**

by .

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A thesis submitted for the Degree of Doctor of Philosophy

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Abstract

Maternal dietary avoidance has been recommended to treat food allergy in breastfed infants although the evidence base for this recommendation is limited. A survey was conducted to benchmark current dietetic practice and it revealed that the majority of Australian specialist paediatric allergy dietitians follow the current recommendations. The foods most commonly restricted are cow's milk, egg, peanut and tree nuts and complete rather than partial avoidance of the causal food protein from the maternal diet was commonly advised.

Maternal dietary restriction to treat breastfed infants with food allergy assumes that food proteins ingested by women are absorbed and excreted antigenically intact into breast milk. Egg is one of the most common food allergens and was chosen as the food challenge for my research because it can be restricted in the diet without nutritionally compromising lactating women. A randomised, blinded, crossover, intervention trial was undertaken in breastfeeding women at the same stage of lactation to determine whether the dietary dose of cooked egg influences ovalbumin content in human milk and whether cooked versus raw egg ingestion alters ovalbumin content in human milk. Breast milk samples were collected from 41 women at two hourly intervals for eight hours after maternal ingestion of no egg, one raw egg, half a cooked egg or one cooked egg and ovalbumin concentration measured by enzyme-linked immunosorbent assay (ELISA). The ELISA method was also developed as part of this thesis. The results demonstrated that at least two thirds of these women had breast milk ovalbumin detected after consuming one cooked egg. A direct, dose response between the amount of cooked egg ingested and human

milk ovalbumin concentration was found. The ovalbumin excretion in response to one raw egg did not differ from ingesting half a cooked egg.

A double-blinded, randomised controlled trial with the primary aim of determining the effect of maternal cooked egg ingestion on the ovalbumin concentration in breast milk fed to infants with egg sensitivity was then conducted. A secondary aim was to determine the effect of maternal egg ingestion on infant eczema severity. Each mother was randomly allocated to consume one muffin per day containing one egg (egg group, n=16) or egg-free muffins (control group, n=16) for 21 days, while mothers and infants followed an otherwise egg-free diet. Breast milk samples were collected on three days at two hourly intervals for six hours after muffin ingestion and ovalbumin concentration measured again by ELISA. Infant eczema assessments (SCORAD scores) were performed at trial commencement and completion. More women in the egg group had consistent breast milk ovalbumin detected at higher peak concentrations and total excretion than the control group. Over the three week period SCORAD scores significantly reduced with time for both groups but the scores were independent of dietary treatment. This lack of difference in mean eczema symptom scores between the groups suggests that maternal dietary avoidance of egg may not be necessary for all breastfed infants with egg sensitivity.

This thesis provides new evidence concerning the effect of egg ingestion on ovalbumin concentration in human milk. This knowledge is crucial for health professionals who recommend maternal dietary restriction to treat food allergy in breastfed infants.