Debra J. Palmer, Jessica Metcalfe, Maria Makrides, Susan L. Prescott
Is cooked whole egg really less allergenic than pasteurized raw whole egg powder? Reply
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Reply to Mauro Calvani

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Calvani et al[1] have raised an interesting question with regard to our recent randomised controlled trial (RCT) on the effects of early regular egg exposure in infants with eczema[2]. The protocol for this trial included a medically supervised cooked egg exposure at eight months of age, during which infants in both groups were given 2 teaspoons of mashed hard-boiled whole egg. The dose equated to 1/6 of an egg, which was equivalent to the amount of pasteurized raw egg the infants in the intervention group had been consuming daily. Twelve of the 75 (16%) infants who had the cooked egg exposure had an allergic reaction, 6/40 (15%) in the egg group and 6/35 (17%) in the control group (RR 0.88; 95% CI 0.31 to 2.47; *P*=0.80). Table 1 details some of the characteristics of these twelve infants. Four of the infants in the intervention (egg) group who had an allergic reaction to the cooked egg exposure also had a previous allergic reaction to the pasteurized raw egg powder and hence the study powder use was ceased. However it was of particular interest that two infants who had an allergic reaction to the cooked egg exposure had regularly consumed the pasteurized raw egg powder. Both of these infants showed increased egg-specific IgG4 levels between the ages of four and eight months, as described in Table 1. It is important to note that both of these infants did have persistent moderate to severe eczema symptoms during the intervention

period. Investigating this further, we have found that the mean objective SCORAD score on the day of the cooked egg exposure was higher (P=0.046) for those infants who had an allergic reaction (mean objective SCORAD = 17.5 ± 14.1) compared to those who tolerated the cooked egg (mean objective SCORAD = 8.3 ± 6.7). We might speculate whether improving the condition of the infant's skin through optimal eczema treatment may be an important management strategy prior to new food introduction, so this could suggest an important new avenue of investigation in light of our observations. Other possible factors which may alter the immune response around the time of consumption of an 'allergenic' food may also play a role. This has been observed in some participants in oral immunotherapy studies who have previously tolerated a particular dose of a food during the desensitization phase but subsequently had allergic symptoms after exposure to the same form and dose of the food during a concurrent illness[3].

In the majority of egg-allergenic individuals, cooked egg has been shown to be less allergenic than raw egg due to changes in protein (allergen) conformation that occurs with cooking. This was seen in our RCT where 32 infants were diagnosed with IgE-mediated egg allergy at 12 months of age, however 23/32 (72%) of these infants tolerated hard-boiled egg (n=21) or baked egg containing foods (n=23). The two infants who reacted to cooked egg despite tolerating the pasteurized raw egg study powder appear to be an anomaly, and their allergic reaction to the cooked egg exposure could have been a result of an altered immune status on the day. In conclusion, caution should always be taken when introducing egg to infants with eczema, but the introduction of cooked egg should be tried to allow a more varied nutritious diet when tolerated.

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References:

1. Calvani M, Giorgio V, Sopo SM. Is cooked whole egg not always less allergenic than pasteurized raw whole egg powder? J Allergy Clin Immunol 2013; XXX(X): XXX-X.
2. Palmer DJ, Metcalfe J, Makrides M, Gold MS, Quinn P, West CE, Loh R, Prescott SL. Early regular egg exposure in infants with eczema: a randomized controlled trial. J Allergy Clin Immunol 2013; 132(2): 387-92.e1.
3. Varshney P, Steele PH, Vickery BP, Bird JA, Thyagarajan A, Scurlock AM, Perry TT, Jones SM, Burks AW. Adverse reactions during peanut oral immunotherapy home dosing. J Allergy Clin Immunol 2009; 124(6):1351-2.

86 ***Table 1: On the day of the cooked egg exposure: characteristics of infants (n=12) who had an allergic reaction to the cooked egg.***

Infant sex	Study powder (ceased due to allergic reaction)	Parent with allergic disease	Objective SCORAD score	Breastfed at cooked egg exposure	Symptoms after cooked egg exposure	Egg-specific IgG4 levels at 4 months old (mg_A/L)	Egg-specific IgG4 levels at 8 months old (mg_A/L)	Egg-specific IgE levels at 4 months of age (kU_A/L)	Egg-specific IgE levels at 8 months of age (kU_A/L)
Male	Egg (No)	Mother + Father	10.9	*No*	Skin rash, urticaria	<0.07	2.0	<0.1	17.3
Male	Egg (No)	Mother	45.9	No	Skin rash, urticaria	<0.07	18.7	0.39	0.6
Male	Egg (Yes)	Father	7.2	*No*	Vomiting	<0.07	1.0	<0.1	0.66
Male	Egg (Yes)	Mother + Father	7.2	*No*	Vomiting	<0.07	<0.07	<0.1	0.51
Male	Egg (Yes)	Mother + Father	17.9	*No*	Skin rash, urticarial, facial swelling	<0.07	Not done*	0.86	Not done*
Male	Egg (Yes)	Mother	19.2	Yes	Facial swelling, vomiting	<0.07	0.12	2.07	7.06
Male	Rice (No)	Mother + Father	22.0	*Yes*	Skin rash, urticaria, facial swelling, vomiting	Not done*	Not done*	Not done*	Not done*
Male	Rice (No)	Mother + Father	0.0	*Yes*	Skin rash, urticaria	<0.07	<0.07	<0.1	<0.1
Female	Rice (No)	No	33.6	*Yes*	Skin rash, urticaria	Not done*	Not done*	0.1	3.42
Male	Rice (No)	Mother	24.9	*No*	Generalised skin rash	<0.07	Not done*	0.31	Not done*
Female	Rice (Yes)	Father	11.1	Yes	Urticaria, vomiting, respiratory difficulties (anaphylaxis)	Not done*	0.23	Not done*	18.2
Male	Rice (Yes)	Mother + Father	0.0	No	Skin rash, urticaria, vomiting	0.9	4.13	43.6	8.86

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89 **** Unsuccessful blood collection***