

## Food allergy in fully breast-fed infants

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### Introduction

It is widely accepted that potentially allergenic macro-molecules are absorbed by the normal adult gut (Lancet, 1978) and may pass from mother to infant in breast milk (Matsumura *et al.*, 1975). Several decades ago physicians realized that such substances could produce adverse reactions in susceptible infants (Shannon, 1921; Talbot, 1918), and more recently have suggested that they can cause infantile colic (Illingworth, 1954), vomiting, diarrhoea, eczema, asthma and rhinorrhoea (Glaser, 1956). Unfortunately, the reports are anecdotal and rely on unsubstantiated information from parents. This paper presents two infants with allergic reactions to extrinsic food antigens transmitted in their mothers breast milk and suggests a method of evaluating the phenomenon objectively.

### Case reports

#### *Case 1*

A male infant, who was fully breast-fed, receiving no additional feeds in any form until 3 months of age, developed intermittent vomiting, diarrhoea and episodes of uncontrollable screaming from one week of age. Traditional treatment for 'infantile colic', dicyclomine hydrochloride (Illingworth, 1959), produced transient relief of symptoms. Selected cow's milk and egg-free weaning was commenced at 3 months and there was a temporary improvement. At 5 months he received his first egg and within hours developed an eczematous rash on his chin, which occurred with all subsequent exposures. By 7 months it became clear that he would vomit profusely within 5 to 10 min of any feed containing egg or cow's milk.

Skin prick testing at 8 months gave positive reactions to egg (3 mm weal) and cow's milk (5 mm weal), but to none of the usual inhalant allergens. His serum IgA was low

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(12 iu/ml) and total IgE, by double antibody technique, slightly raised (21 iu/ml). Withdrawal of egg and milk from his diet produced immediate and lasting resolution of all symptoms. He remains well at 15 months of age though a recent attempt to reintroduce the offending allergens into his diet resulted in a recurrence of vomiting.

### *Case 2*

A male infant was breast-fed without supplements for 3 months and with selected weaning foods until 10 months. He first developed dry skin and cradle cap (seborrhoea of the scalp) at 1 month, when he had received nothing but breast milk. At 4 months he ate his first egg and 24 hr later developed generalized eczema. This was controlled with topical 1% hydrocortisone cream but his mother noticed that the eczema exacerbated 24 hr after she had eaten eggs herself. The infant had positive skin prick test reactions to egg white (7 mm weal) and egg yolk (4 mm weal) but negative to milk and common inhalant allergens. Both mother and infant were, therefore, commenced on an egg-free diet.

*Study.* When the infant's eczema had cleared, mother and child entered a 2-week study period. They remained on an egg-free diet whilst breast feeding continued, but the mother received a powder supplement to her diet which was mixed with milk and taken once daily. For 1 week this contained milk powder and colouring, whilst for the other week milk and egg powder (approximating to one large egg per day). The powders were prepared by the hospital dietetic department, coded A and B and administered double blind by the physician. During the week on powder A the infant had slightly dry skin but otherwise remained well. In the week his mother received powder B, his eczema exacerbated and he also developed diarrhoea and vomiting.

Breast milk specimens were collected 1 hr after taking the powders on the 7th day of each week. A similar procedure was followed by a non-atopic mother, breast feeding a healthy infant. The milk specimens were stored at  $-70^{\circ}\text{C}$  until required. Skin prick testing, using the four undiluted breast milk specimens, was performed on the index infant. A 4 mm diameter flare reaction appeared to the B breast milk specimen from the index case's mother, but there was no detectable reaction to the A specimen or to A and B specimens from the control mother.

Subsequently, powder A was identified as milk powder alone, whilst powder B contained egg and milk powder.

### **Discussion**

As both infants were born into medical families, careful attention had been paid to avoidance of cow's milk, particularly during the neonatal period in the maternity hospital. There is little doubt that they were fully breast-fed until 3 months and yet developed symptoms, later identified to be due to food allergy, long before they received these foods. They must, therefore, have been sensitized and rendered symptomatic by allergens in the maternal breast milk.

'Infantile or evening colic' is an ill-defined condition of intermittent uncontrollable screaming with drawing up of legs as if in pain, usually occurring in the evenings, up to 12 weeks of age. It occurs equally frequently in breast and bottle-fed infants and can often be relieved by the antispasmodic drug, dicyclomine hydrochloride (Illingworth, 1959). Jakobsson & Lindberg, (1978) demonstrated relief of 'infantile colic' in thirteen of eighteen fully breast-fed infants when their mothers were put on a cow's milk free diet. However, only three developed other symptoms of cow's milk protein intolerance

during weaning. It is likely that the 'colic', vomiting and diarrhoea in case 1 were due to food allergy, even when he was fully breast-fed. The diagnosis was only established when breast feeding had ceased, leaving the hypothesis unproven.

In case 2, the egg allergy was diagnosed whilst breast-feeding was still in progress, making it possible to prove that eczema was exacerbated by antigen appearing in the mother's breast milk. The double blind study objectively demonstrated that food antigen penetrated into breast milk and caused disease. This exercise should be used in any future studies of this problem.

The absence of a skin test response to breast milk from the control mother on an egg-containing diet is interesting. When allergy arises in fully breast-fed infants, the underlying cause may be an abnormality in the mothers, rather than the infants, allowing larger quantities of allergens to appear in their breast milk, which are more likely to sensitize their infants. This certainly requires further investigation.

Teleology would dictate that the presence of antigens in breast milk is necessary for normal development. As the quantities are so small, they are unlikely to be of nutritional value. Perhaps exposure to food antigen in early infancy results in the induction of immune tolerance, a phenomenon which has been demonstrated in infant mice (Swarbrick, Stokes & Soothill, 1979). However, if this exposure is excessive or if the infant is unduly susceptible to sensitization, then allergy may occur.

Jarrett (1977) in studies on mice, suggested that protection from allergy may depend on activation of IgE suppressor T cells by large quantities of antigen, and Björkstén & Saarinen (1978) have reported that this mechanism may be operative in the human neonate. Thus Juto & Björkstén (1979) stated that exposure to large amounts of antigen would be more appropriate than attempted avoidance. Continuing exposure to minute quantities of antigen in infants with abnormal suppressor T cell responses, one of the suggested basic defects in atopic individuals (Strannegård, Strannegård & Juto, 1978), might result in stimulation of IgE antibody production. Thus, current recommendations for full breast-feeding and attempted reduction of exposure to foreign proteins in early infancy (Matthew *et al.*, 1977) may actually promote the development of allergy, rather than protecting against it.

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