

Breast feeding and atopic dermatitis

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The role of breast-feeding in the treatment of atopic dermatitis and other allergic diseases is a matter of controversy. Often, protection against the development of allergy, i.e. primary prevention, is confused with the fact that, in infants already allergic to cow's milk, avoidance of the offending allergen is important. In this review the role of breast feeding in children with an established food allergy (secondary prevention) is initially discussed. Conditions then will be discussed under which breast feeding seems to prevent, or rather, delay the onset of allergy, and under which conditions the protective effect is at best marginal.

Breast feeding in the treatment of atopic dermatitis

It has been acknowledged for a long time that breast-fed infants may react to foods in their diets. Symptoms include eczema (1-3) and infantile colic (4). These and numerous similar observations have prompted studies of dietary manipulation of the maternal diet.

In two controlled studies of 37 breast-fed infants with eczema, Cant et al. (5) assessed whether changes in the mother's diet affected the skin condition. In 6 infants, the eczema improved when the mothers avoided egg and cow's milk and worsened again when these foods were reintroduced. In two additional infants, gastrointestinal reactions occurred after maternal ingestion of these foods. The conclusion of these studies was that, although most breast-fed babies with eczema do not respond to maternal dietary manipulation, some infants do benefit from a maternal dietary exclusion.

Breast feeding in the prevention of allergic disease

Studies of the possible protective role of human milk against allergy have produced widely var-

ying results. Generally, studies reporting a protective effect have focused on respiratory symptoms, while studies, examining all atopic symptoms including atopic dermatitis, have often yielded less clear-cut results. There also are variations in the study design. Some studies have been retrospective, others have failed to take account of the possibility that the effects of breast feeding differ in infants with and without a family history of allergy. In some studies avoidance of potent sensitizing foods, e.g. cow's milk and fish, was evaluated as well as comparing breast feeding and formula feeding. Since it is very difficult in a retrospective study to accurately exclude the possibility that an allegedly fully breast-fed baby has not received small amounts of formula on single occasions, only prospective studies should be considered.

As summarized in 1983 (6), up to that year eight studies fulfilled this criterion. In five of them, breast feeding for at least 1 month appeared to result in a lower incidence of allergy for at least up to 3 years. (7-11). The three other studies showed no preventive effect of treatment (12-14). In one of them no difference was found in the incidence of childhood allergy in babies who were fed human milk, soy or cow's milk but most of the breast-fed infants were given soy milk-based supplements and the two groups included infants who were fully breastfed for only 2 weeks (12).

Another report concluded that breast-feeding had no significant effect on the incidence of eczema (13). In this study of more than 1100 infants there was, however, a tendency towards a lower incidence of eczema in a breast-fed subgroup of infants who had a positive family history and who were given no solid foods for the first 4 months of life. This difference was apparent when the group was compared with

Table 1

Factors influencing protective effect of breast feeding
in food allergy prevention

<i>Infant</i>	
	Genetic risk for allergy
	Time for introduction of other foods
	Duration of breast feeding
<i>Mother</i>	
	Diet
	Immune status

the group with similar family history and early avoidance of solid food but who received milk formulae.

In yet another prospective study comprising 250 infants from atopic families, breast feeding did not protect against either the development of atopy (particularly eczema) or an increase in IgE to abnormal levels (14). But it is not known whether in this study breast feeding for 3 months also was combined with exclusion of other foods.

More recently, Businco and coworkers (15) have reported significantly less respiratory tract allergy and eczema in a breast-fed group of babies with elevated cord blood IgE as compared to bottle-fed infants with elevated cord blood IgE levels. Similar findings have been reported by Chandra, who also found that breast feeding was associated with less allergy only in the subgroup of infants with an elevated IgE level at birth (16).

The issue is further complicated by the recent finding that not only duration of breastfeeding but also the immunological status of the nursing mother affect the outcome. Table 1 summarizes infant and maternal factors that should be considered in relation to possible allergy preventive effects of breast feeding.

Protective mechanisms

Breast feeding could protect against the development of allergy by several mechanisms (Table 2). The most obvious possibility is that it lessens exposure to foreign antigens, so reduc-

ing the risk of sensitization for healthy infants and lessening the symptoms in an already sensitized baby. However, a low antigen content may be a mixed blessing, since animal studies have demonstrated that minute amounts of parenterally administered antigen are more effective for sensitization than higher doses, including IgE antibody responses (17).

It has been shown repeatedly that low amounts of antigens are present in human milk and that this may result in the appearance of IgE antibodies and clinical hypersensitivity in infants who have not eaten the foods in question (18, 19). We have therefore analyzed whether manipulation of the maternal diet could prevent the development of allergy in the babies. This was done in a prospective study of 115 newborn babies with a high risk for allergy development as indicated by a strong family history and/or an elevated level of IgE in cord blood (20). All the babies were exclusively breast fed for 6 months or received a protein hydrolysate (Nutramigen®). In addition, no tobacco smoking and no pets were allowed in their homes. The mothers either adhered to a diet strictly avoiding cow's milk, eggs and fish for 3 months, or had no dietary restriction. In the 65 babies of mothers on the diet, the rate of atopic dermatitis was significantly lower for the first 6 months of life than in the control group. After 6 months of age there was a trend towards a lower disease rate up to 18 months and significantly milder disease at 9 months. The clinical observations were supported by the finding that IgE antibodies to the foods were encountered commonly at 6 weeks and 3 months in babies of mothers on a regular diet but not in those whose mothers were adhering to the diet. At 6 months, of age i.e. 3 months after reintroduc-

Table 2

Possible reasons for allergy preventive effects
of breast feeding

Low content of allergens
Transfer of maternal immunity
Regulation of infant immunity
Protection against infections
Influence on gut microbial flora

tion of the foods to the mothers but at a time when none of the babies had eaten egg, milk or fish proteins, the rate of sensitization was similar in the two groups. Similar results have been reported by other groups, although diet during pregnancy and lactation were not clearly differentiated (21, 22).

Maternal immunity is transferred to the babies over the placenta and in the breast milk. Maternal serum IgG antibodies to cow's milk have been reported to influence cow's milk allergy in their babies (23). But, in two recent large randomized studies from Sweden this could not be confirmed (24, 25). The difference between the studies may possibly be explained by the fact that in contrast to the Belgian study (23) none of the Swedish babies (24, 25) received any cow's milk formulae before 3 months of age and thus were only exposed to low doses of antigens present in the breast milk or to small peptides present in protein hydrolysate formula.

The breast milk levels of IgA antibodies to cow's milk proteins may affect infant allergy. In a study of 57 breast-fed infants 11 developed allergic disease (26). The breast milk from mothers of these 11 infants was found to have lower total IgA and IgA antibodies to whole cow's milk and casein than milk from mothers whose infants had few or no symptoms. Beta-lactoglobulin was present in 45% of all breast milk specimens but this was unrelated to antibody levels in the milk or symptom scores in the babies. The study indicates that inadequate quantities of maternal IgA antibodies to food antigens could play a role in the development of infant allergic disease in breast-fed infants.

Human milk also directly affects the neonate's immune system. Reported effects include transfer of cell-mediated immunity from mother to offspring and stimulation of IgA synthesis in the infant (27, 28). It also has been shown very recent that levels of secretory IgA in the urine are higher for the first 12 weeks of life in breast-fed than in formula-fed infants (29).

Breast milk may have a yet not fully understood affect on infant IgE regulation. Sarfati et al. have identified IgE binding factors with

regulatory properties in human milk (30). The clinical importance of this observation and of the notion that certain milk samples from atopic mothers may possibly enhance IgE antibody formation by cord blood cells (28) remains unknown.

All these findings, however, strongly suggest that breast milk has a direct effect on infant immune competence. Such effect on immunity in babies may be protective since atopic allergy appears to be associated with a primary functional abnormality of the immune system, possibly a defective suppressor system, particularly of IgE synthesis (reviewed in 31). Infants with this defect would represent a high-risk population particularly dependent on human milk. The dependence could be a need for immune regulatory factors that are present in human milk as well as a need to avoid exposure to foreign antigens in early life. These high-risk infants can often be identified at birth by their raised cord blood IgE or later during infancy, even before allergic symptoms develop, by elevated IgE levels, presence of IgE antibodies against food and by various lymphocyte tests (reviewed in 32).

It is well-established that breast feeding has an important role in the protection against infections in the baby (33). There are also several observations indicating a relationship between respiratory and gastrointestinal infections on one hand and development of allergic diseases on the other (34, 35). It is possible that an allergy - preventive effect of breast feeding is secondary to a reduction in the number of infections in the baby.

There are differences between breast-fed and bottle-fed babies in their gastrointestinal flora (36). Since the microbial flora in the gastrointestinal tract has certain adjuvant properties for infant immunity it is tempting to speculate that these differences may possibly play a role also for allergy prevention.

Clinical consequences

In high-risk babies, the incidence of allergic diseases seems to be significantly higher in

those infants who are fed cow's milk than in breast-fed infants. In the study of Saarinen et al. (9), breast feeding was protective against allergy only in those infants with a positive family history who were not given solid foods. These studies have been supported by others (11, 15, 16). Thus, avoidance of solid foods in addition to breast feeding appears to be prophylactic for atopic disease in infants with a positive family history. This conclusion is supported by the results of prospective studies. The suggestion that exclusive breast feeding is important for a subgroup of high-risk infants, and the fact that maternal immune status and diet play a role may explain some of the current controversy on infant feeding and the development of allergy. The important issue is not whether breast-feeding prevents allergy but rather the conditions under which the benefits can be shown. Probably breast feeding plays a role in the development of allergy only in a minority of high-risk children.

Additional consideration must be given to two other possible mechanisms of protection. Human milk has antimicrobial activity and in consequence, breast-fed babies have fewer infections than infants receiving formulae (33). This in turn may result in a lower incidence of atopic disease since respiratory tract infections may increase the risk of sensitization and the development of allergy. Another, not investigated possibility, is that the introduction of cow's milk, which alters the gastrointestinal flora, might promote growth of a bacterial flora with adjuvant properties which in turn could enhance sensitization. Whichever mechanism is the dominating factor in the protection against development of allergy, the overall effect appears to be temporary, since breast-feeding, rather than preventing atopic disease, appears merely to delay the onset. Even this limited aim is, however, of considerable importance.

Evaluation of the possible protective effects of breast-feeding is further complicated by a recent finding that the season of birth may influence the results. A Finnish study (37) reported a similar incidence of allergy to pollen in infants who were either fully breast-fed or fully fed on cow's milk during their first pollen season.

However, the infants who had been weaned during the pollen season had a significantly reduced incidence of allergy against that particular pollen but not against other allergens, including other pollens not in season during the period of weaning. These interesting findings, if confirmed by other studies, could indicate that in certain infants, massive exposure to foreign proteins, e.g. from cow's milk, is needed to stimulate immune regulatory mechanisms that conceivably are defective in some babies. Thus not only duration of breast feeding may be involved, but also the relationship between breast-feeding, season of birth and degree of exposure to allergens.

These findings also are supported by a recent Swedish study in which early feeding with cow's milk during the first days of life, followed by full breast feeding, was associated with a significantly lower incidence of allergy than starvation during the first days of life (38).

The question of breast feeding and development of allergy is obviously not a simple one. Any protective effect is obscured by other environmental influences such as feeding with other foods and possibly early exposure to inhalant allergens and pollution as well as by the maternal immune status. Although allergy does not seem to be prevented by breast feeding, merely delaying the onset of disease in children is important. This delay in onset seems to be associated with a lessening in disease severity. Parents with a severely affected infant or child also would agree that postponed onset of disease is of great value in itself.

CONCLUDING REMARKS

The protective effects of breast feeding against allergy, particularly eczema, seem to be moderate and limited to a group of babies with a high risk for allergy. Breast feeding should be combined with an avoidance of solid foods for at least 4 months. Maternal diet during lactation (but not during pregnancy) may influence the rate of allergy in the babies. The protective effect of breast feeding in risk infants is possibly explained by the immune regulatory effect on the infants as well as by low allergenicity.

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