

Prevention of Allergies

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The development of a food allergy depends on several factors, including genetic factors and early exposure to allergenic proteins in the diet, food protein uptake and handling, and the development of tolerance.¹ Chicken eggs, cow's milk (including all dairy products), peanuts, fish, nuts, wheat and soya are foods that are most likely to induce food-specific immunoglobulin (Ig) E sensitisation in infancy and childhood. Avoidance of food allergens is a possible mechanism for prevention.²

The critical stage at which the food allergen should be avoided however, is still very much debated, is it with the mother prenatally or during lactation or with the infant, during weaning or when breast milk does no longer suffice?

Should Allergenic Foods be restricted in a Mother's Diet during Pregnancy?

The foetus can mount an immunologic response to foods and other allergens. Occasionally, specific IgE responses to foods and frequently T-cell responses to milk and egg proteins and aeroallergens are seen in the foetus and newborn.³ These responses may be normal immunologic phenomena and not be related to the subsequent development of food allergy. Falth-Magnusson et al attempted to prevent cow's milk and egg allergy with maternal cow's milk and egg avoidance during the third trimester, this study failed to reduce food allergy or any other atopic disorder or sensitisation from birth through to five years.⁴ In addition, maternal weight gain during pregnancy was compromised by the restriction of cow's milk and egg. Therefore the general consensus is that there is no reason to follow a specific diet during pregnancy.⁵

Maternal Avoidance of Allergenic Foods during Lactation

Many studies have evaluated the effect of maternal food allergen avoidance diets during lactation for preventing atopic disease in high-risk infants. Two prospective controlled studies, evaluated whether maternal avoidance of egg, cows milk, and fish for the first three months of lactation or avoidance of these foods plus soy and peanut avoidance for the entire lactation period compared with unrestricted maternal diets affected atopy

in high-risk infants placed on a relatively hypoallergenic dietary regimen during infancy. The studies noted significant reductions in eczema in the maternal diet groups by 3, 6 and 18 months. At 10 years, the rates of clinical food allergy, atopic dermatitis, allergic rhinitis, bronchial asthma, and sensitisation to the three maternally avoided foods (milk, egg and fish) and aeroallergens were the same between children whose mother's did or did not avoid foods during lactation.⁶

Two other studies conflict with the above findings. A nonrandomised but well-controlled prospective investigation in high risk German newborns failed to show any reduction in atopic dermatitis and cow's milk and egg sensitisation with maternal avoidance of cow's milk and egg during the third trimester of pregnancy and lactation.⁷ In addition, a non randomised case-control investigation from Southampton, United Kingdom, reported that high-risk infants of mothers who avoided food allergens developed significantly more eczema and food sensitisation from 6 – 18 months of age.⁸

Given this difference and the uncertainty of the effect of lactation diets for primary prevention, it might be feasible to implement maternal lactation avoidance diets only after individual evaluation of each family's atopic risk and circumstances. This suggestion is consistent with the conclusion reached by those who conducted the studies: that individual rather than general support should be recommended for maternal avoidance diets during lactation for allergy prevention. In light of this, Hattevig et al recommended that all mothers take supplemental calcium (up to 1500mg daily) and a multivitamin during restricted lactation diets.⁶

Breastfeeding Exclusively and Prolonged

Breastfeeding is highly recommended for all infants irrespective of atopic heredity. It provides many advantages to the offspring, but presently there is ongoing debate whether or not it prevents allergy any better than certain formulas. Human milk is the food best adapted to the needs of the offspring, also because it provides efficient protection against infections and actively stimulates the development of the infant's own immune system. The major

host defense system is provided via the secretory IgA antibodies produced in the mammary glands by lymphocytes, which have migrated there from the mother's gut mucosa. Therefore, these antibodies in the milk are primarily directed against the microbes in the mother's gut and her food proteins. As a result, breast-feeding starting directly after delivery will provide an excellent defense against the microbes normally meeting the neonate and are needed to induce development of its immune system. Breast milk also contains numerous components, which seem to enhance the infant's host defense as well as capacity to develop tolerance, helping to avoid allergic reactivity to foods etc.^{9,10}

Breast milk has also been found to inhibit the increase in food antigen absorption that occurs early postnatally in animals. Total secretory IgA and milk-specific IgA antibodies to whole cow's milk and casein have been reported to be significantly lower in breast milk and colostrums from mothers of infants with cows milk allergy compared with those without cow's milk allergy.^{11,12} Immune factors in milk including low levels of IgE antibodies, although higher in atopic than nonatopic mothers, chemokines, which differ in atopic and nonatopic mothers, do not seem to affect the development of allergy.^{11,13}

A 17-year nonrandomised study reported that, compared with short or no breastfeeding, 6 months of exclusive breastfeeding is associated with less eczema and food allergy at ages 1 and 3 years and has a long-term allergy protective effect on respiratory allergies during adolescence.¹⁴

Use Hypoallergenic Protein Hydrolysates in Bottle-fed High-Risk Infants and as Supplementation for Breastfeeding

If a mother does have to provide supplementary feeding or if her breast milk does not satisfy the infant, then a hypoallergenic formula will protect her infant against allergies just as would breast milk. These hypoallergenic formulas are termed protein hydrolysates which are either partial or extensive depending on the extent of hydrolysis and ultra filtration to which they are subjected. Allergenicity lessens as hydrolysis and filtration become more extensive.¹⁵

In a short-term, prospective study aimed at assessing the effects of partially hydrolysed formula on the prevention of the development of atopic dermatitis in infants at high risk, Han et al found that the cumulative incidence and prevalence of atopic dermatitis at the age of 6 months were significantly less in the partially hydrolysed formula group than in the standard formula group (47% vs 78%, $p < 0.05$; 20% vs 59%, $p < 0.05$). The rates of the partially hydrolysed formula group were also less than those of the breast milk group, but they were not statistically significant. There was no difference in the onset age and disease severity. These results suggested that early feeding of partially hydrolysed formula to infants at high risk has a short-term preventive effect on the development of atopic dermatitis during the first six months of life.¹⁶

Delay Introduction of Solid Foods

A very important determinant of the appropriate age for weaning is the physiological maturity of gastrointestinal and renal function. There are concerns, firstly that the high permeability of the young infant's digestive tract may permit large foreign proteins to penetrate and provoke immune sensitisation; and secondly, that foods with a high solute load may result in the need to concentrate urine to a degree that exceeds the capacity of the young infant's kidneys.¹⁷ Breastfeeding and a late introduction of solids (> 4 months) were found by Halken and Host to be associated with a reduced risk of food allergy, atopic dermatitis and recurrent wheezing and asthma in early childhood. In all children, breastfeeding should be encouraged for 4 – 6 months. In high risk infants a documented extensively hydrolysed formula is recommended only if exclusive breastfeeding is not possible for the first 4 months of life.¹

When introducing complementary foods, attention should be made to ensure that up to the child's first birthday, all foods that are known to cause allergies are completely avoided. As complementary foods are built up, simple products comprising of one ingredient such as apples should be used, a meal should contain no more than three simple ingredients (e.g. chicken, carrots and rice).¹⁸

Recommendations for Primary prevention

- Exclusive breastfeeding for at least 4 to 6 months
- No pregnancy allergen avoidance diet except for peanut avoidance
- Maternal lactation avoidance diets determined on an individual basis except for the universal avoidance of peanut.
- Stored frozen breast milk or an extensive partially hydrolysed formula for supplementation of breastfed infants or an extensive partially hydrolysed formula for bottle fed infants
- Extensive partially hydrolysed formula containing probiotics and prebiotics.
- Delay introduction of solid foods until 6 months, adding the least allergenic foods first and others later.

Because primary allergy prevention is not static and is in transition, these recommendations may change in the future.¹

Probiotics:

Probiotics are defined as live micro organisms that, when administered in adequate amounts, confer a health benefit to the host.¹⁹ Probiotics are cultures of potentially beneficial bacteria that positively affect the host by enhancing the microbial balance and therefore restore the normal intestinal permeability and gut micro ecology, improve the intestine's immunologic barrier function and reduce the generation of pro inflammatory cytokines characteristic of allergic inflammation.²⁰

In small infants, most reactions to foods are manifested in the gastro-intestinal tract. As children get older, cutaneous and even systematic or respiratory manifestations of food intolerances may be more common. In most instances, allergic disorders in the gut cause inflammation in the mucosa. Vanderhoof et al noted significant improvement in infants receiving Lactobacillus GG in their extensively hydrolysed formula.²¹

Prebiotics:

Fructo-oligosaccharides (FOS) and trans-beta-galacto-oligosaccharides (TOS) have been claimed to benefit the health of the colon by selectively stimulating the growth of bifidobacteria and lactobacilli (prebiotic effect). It has been found to be of clinical significance to manipulate colonic flora because it is supposed that specific bacteria in the gut microbial microflora could promote potentially antiallergenic processes and play a key role in atopic disease prevention. New preterm and term infant milk formulas, supplemented with a mixture of TOS and FOS as prebiotic ingredients induced a significantly higher colonisation of bifidobacteria and lactobacilli sighted by Miniello et al. In the future, selective manipulation of the intestinal microbiota might be a novel prophylactic and therapeutic intervention strategy of atopy, by redirecting allergic Th-2 responses in favour of Th-1 responses.²²

Conclusion

Primary prevention through a hypoallergenic diet in infancy may reduce the prevalence of food allergy and associated co-morbidity. Breastfeeding

has many advantages and should be recommended for all children. Those with a history of atopy in the immediate family are at a higher maternal risk and maternal diet during lactation, avoiding highly allergenic foods, may enhance the benefit. Cow's milk should be strictly avoided, and supplementation with a hypoallergenic formula may be required. Delayed introduction of eggs, nuts, wheat and fish has also been suggested. Dietary restrictions may have nutritional consequences for the mother and child and supervision by a dietician is essential. Maternal dietary restrictions during pregnancy are not strongly recommended as the benefit is minimal and there may be adverse effects on foetal nutrition. In high risk infants, a combined approach, where breastfeeding with maternal avoidance of hypoallergenic foods, supplemented by extensively hydrolysed formula during the first six months of life, in addition to the delayed introduction of solid foods, has been shown to reduce the development of food allergy in infants.²³ ♀

References

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