

What Causes Allergy and Asthma? The Role of Dietary Factors

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The expression of allergic disease may vary with age. In infancy the main atopic symptoms are atopic dermatitis, gastrointestinal symptoms, and recurrent wheezing, whereas bronchial asthma and allergic rhinoconjunctivitis are the main problems later in childhood. Adverse reactions to foods, mainly cow's milk protein, are most common in the first years of life, whereas allergy to inhalant allergens mostly occurs later. This natural course of the diseases is very important to take into consideration when evaluating the results from studies on development and prevention of allergic diseases.

The development of atopic disease depend upon a complex interaction between genetic and environmental factors including environmental exposure to food and inhalant allergens and many other environmental factors such as tobacco smoke, air pollution, infections and possibly also other dietary factors and intestinal microbial flora. Many interesting hypotheses, as regards possible causal relationships, have been raised, but so far most of these remain to be documented.

Only well designed prospective studies should be used for evaluation of possible risk factors for the development of allergic diseases and the possible effect of preventive measures. In general, prospective non-interventional studies can be used to generate hypotheses on the relationship between cause and effect in development of allergic diseases. Proper confirmation of a possible cause-effect relationship requires demonstration of the causative mechanism and effect of elimination/prevention of the suspected causative factors in randomised controlled studies. However, in some cases where correct randomisation is not possible, e.g. in studies evaluating the effect of breastfeeding, high quality observational prospective studies may provide the best evidence. The role of some dietetic factors has been investigated in prospective non-interventional as well as interventional studies.

BREASTFEEDING

Whether breast-feeding helps prevent allergy remains controversial due to the lack of evidence in some studies and because infants cannot, ethically, be randomly assigned to breast-feeding or formula feeding to enable a definitive study.

In prospective observational studies and one randomised study *breastfeeding* for at least 3–6 months and late introduction of solid foods (after 4–6 months) is associated with a decreased risk of cow's milk protein allergy (CMPA)/food allergy (FA) & atopic dermatitis up to 3 years and recurrent wheeze/asthma up to 6(–17) years.

Two meta-analyses using predetermined standardized inclusion criteria for trial appraisal, and a systematic review demonstrated an overall protective effect of exclusive breastfeeding during the first 3–4 months of life on atopic dermatitis and asthma in the first 5–10 years of life, especially in infants with atopic heredity.

Recent studies indicated that variations in the composition of human milk might partly explain some of the controversies regarding the protective effect of human milk. There is no evidence of preventive effect of special maternal diet neither during pregnancy nor lactation.

HYDROLYSED FORMULAE

Different hydrolysed formulas (HF) have been employed in prospective interventional studies on prevention/reduction of the incidence of food allergy in high-risk infants.

As reviewed in a position paper of ESPACI and a joint statement of ESPACI and ESPGHAN prospective, randomised, controlled studies on high-risk infants have shown a preventive effect of different dietary allergy prevention programmes. This preventive effect has only been demonstrated in high-risk infants. Due to great variations in study design and diagnostic criteria it is difficult to compare the effect of these programmes.

There has been shown a preventive effect of *extensively hydrolysed formulas (EHF)* in combination with avoidance of cow's milk proteins and solid foods during at least the first 4 months in high-risk infants on the

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cumulative incidence of atopic dermatitis and FA (especially CMPA) until the age of 7 years. Thus, a real prevention, and not only a postponement of the onset of the disease, has been documented.

Also a preventive effect of *partially hydrolysed formulas (PHF)* has been reported in randomised prospective studies in high-risk infants. Recent data from studies comparing the allergy preventive effect of PHF and EHF indicate a greater effect with EHF in studies with well defined diagnostic criteria. In one recent study the preventive effect, a reduction in the prevalence of atopic dermatitis, was particularly seen in infants with family history of atopic dermatitis. If these results are confirmed in future studies, dietary preventive measures may be targeted more specifically.

There is no evidence that *soy formulas* or *other formulas* based on whole proteins other than cow's milk proteins are less allergenic than cow's milk based formulas.

SOLID FOODS

Introduction of solid foods before 4 months of age has been associated with a higher risk of atopic dermatitis in prospective non-interventional studies.

OTHER DIETARY FACTORS

The results of cross-sectional studies suggest that dietary factors such as low intake of fresh fish, omega-3 fatty acids, high sodium intake, or inadequate intake of antioxidants may influence respiratory symptoms and asthma. However, these possible causal relationships need to be confirmed in prospective studies.

CONCLUSION

Several prospective studies have shown an association between exposure to food allergens during the first 4–6 months of life and development of food allergy and atopic dermatitis. Exclusive breastfeeding during the first 3–4 months of life is associated with a reduced risk of atopic dermatitis and asthma in the first 5–10 years of life, especially in infants with atopic heredity. In high-risk infants exclusively breastfeeding or feeding an extensively hydrolysed formula is shown to result in a reduced risk of food allergy, especially cow's milk protein allergy, and atopic eczema. The possible importance of other nutritional factors remains to be documented in prospective longitudinal studies.