Infant feeding and allergy prevention

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Many countries and international bodies have made recommendations on how to feed infants in order to reduce their risk of developing food allergy. Due to the lack of firm scientific evidence the recommendations differ widely. Over the last decade scientists have debated and researched how infant feeding may influence the later development of food allergies. Although all authorities agree that breast milk is the food of choice for infants, the evidence that it prevents food allergy is contradictory with different studies showing protection, no effect, and even increased risk. It is well known that if close family members of an infant have a history of allergy, the infant will have a higher risk of becoming allergic. If breastfeeding is not possible for these infants, limited evidence shows that cow’s milk-based formulas of reduced allergenicity may reduce the likelihood of developing allergies. The best time for an infant to be introduced to solid foods in order to avoid food allergies remains unclear as both too early and too late introduction may be problematic. Another potential way to reduce the development of allergies is to change the micro-organisms present in the infants gut. The evidence is not conclusive but in some studies where this happened, the infants developed less atopic dermatitis (a form of eczema which may be triggered by food allergy).

Why is it important to prevent food allergy?
Individuals with food allergy develop symptoms after eating foods that for the vast majority of the population form part of a healthy diet. Currently, the only way for allergic individuals to manage food allergy is to avoid eating the foods that cause the allergic reactions. The level of avoidance required may seriously impair their quality of life.

The number of people with allergy is increasing. Although we do not know for sure, a few studies suggest that the same is true for food allergy. We do not have a clear understanding of why more people are becoming allergic. Nor do we know whether the causes of food allergy are the same as those for allergy in general. It is well known that infants with food allergies are more likely to develop other allergic diseases, such as asthma, later in life compared to infants without food allergies. However, one allergic disease is unlikely to directly cause another. A better explanation for the observation is that food allergies and allergic diseases in general probably have many risk factors in common so they are seen in the same people. Therefore, if we can prevent food allergy we might reduce the number of people with allergic diseases as a whole and thus improve the quality of life for the allergic population and their families.

What is food allergy?
Some people develop symptoms when eating certain foods that cause no problems to most people. Food allergies occur specifically when the immune system is involved in the reactions that cause the symptoms. Our immune system protects our bodies from infections, for example, by producing antibodies to fight germs. We do not understand why, but in some people the immune system mistakenly produces the \textbf{IgE} antibody to harmless things like some foods, giving rise to food allergies. Food \textbf{allergens} (the parts of food responsible for an allergic reaction) are usually proteins, and there are usually several kinds of allergens in each food. It is not yet clear what makes some food proteins allergens, and not others. Not all food allergies involve IgE. Some people have allergic reactions where other immune pathways are activated.
Current recommendations and knowledge about infant feeding and food allergy prevention

Recently, researchers in the EU-project EuroPrevall surveyed what 15 European countries (Austria, Czech Republic, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Lithuania, Netherlands, Poland, Russia, Spain, United Kingdom) and 3 other countries (Australia, South Africa, USA) recommend about infant feeding and allergy prevention. The focus was on the duration of exclusive breastfeeding, types of infant cow milk based formulas, when to introduce solid foods, and use of supplements to change the microorganisms of the gut. The researchers also looked at what evidence is available to support the different recommendations. The figure below summarises the recommendations of the 18 countries surveyed.

![Infant feeding recommendations chart](https://www.colourbox.com)

Duration of exclusive breastfeeding (no solid foods or supplementary infant formula)

For a great number of reasons all authorities agree that breast milk is the food of choice for infants whether it prevents food allergy or not. For most countries surveyed, there are no specific breastfeeding recommendations for allergy prevention beyond recommending exclusive breastfeeding for 4-6 or 6 months. Poland, Greece and Ireland do recommend that mothers of high risk infants eliminate specific common allergenic foods from their diet.

Because of undoubted health benefits of breastfeeding, it is unethical to conduct randomised studies where the scientists decide by lot which mothers should breastfeed and which should use infant formulas to study if breastfeeding prevents food allergy. The best a scientist can do is to study children where the mother has decided whether to breastfeed or not. The results of such studies are harder to interpret than results from randomised studies. Scientists have conducted such studies to
look at the relationship between breastfeeding and allergy. The evidence is contradictory with different studies showing protection, no effect, and even increased risk.

Several studies seem to show that it is only in high risk infants that breastfeeding may prevent allergic diseases. Several studies have reported that infants at high risk of developing allergy who are breastfed for at least 3-4 months have a reduced risk of cow’s milk allergy, lower blood levels of IgE, less eczema, and fewer asthmatic episodes. However, other studies in high risk infants found no protective effect of breastfeeding on the development of food allergy. This may be due to variations in breast milk composition or differences in maternal diet. Exclusive breastfeeding for at least 6 months was not better at protecting against food allergy than 4-6 months of exclusive breastfeeding. A couple of studies seem to show that while breastfeeding may have a protective effect on allergic diseases in the first years of life, the children were not less allergic at about the age of 6-7 years. Recently a study showed that while the risk of food allergy was decreased in breastfed children up to the age of 7 years, the risk was increased in adulthood.

**Types of infant cow’s milk-based formulas**

It is well known that if close family members of an infant have a history of allergy the infant will have a higher risk of becoming allergic. If breastfeeding is not possible for these infants, there is limited evidence that cow’s milk-based formulas of reduced allergenicity may reduce the likelihood of developing allergies, particularly in cow’s milk allergy.

To reduce the allergenicity of cow’s milk-based formulas their manufacturers digest (hydrolyse) the milk protein (casein and/or whey) into smaller pieces which destroys the allergens in the milk. The milk proteins in extensively hydrolysed formulas are split into smaller pieces than the milk proteins in partially hydrolysed formulas. Extensively hydrolysed formulas are suitable for most infants with a diagnosed milk allergy. In contrast, partially hydrolysed formulas are aimed at reducing the risk of developing milk allergy, but are not suitable for most infants with an already established allergy to milk.

Two European expert groups and 13 out of the 18 surveyed countries recommend that parents of high risk infants should feed them a cow’s milk-based formula of confirmed reduced allergenicity if the infants are not breastfed. Many of the recommendations do not specify whether the parents should use an extensively or partially hydrolysed formula. That is because study results contradict each other. One study showed that extensively hydrolysed casein formula and partially hydrolysed whey formula reduced the risk of developing allergy. Inexplicably, extensively hydrolysed whey formula did not have the same effect.

**When to introduce solid foods**

To acquire a food allergy we need to be in contact with the food at least once so that the immune system either becomes primed to react to it or is trained to recognise it as harmless. However, we know very little about how much of an allergen we need to eat or be in contact with in other ways in order to become allergic, or how much is needed for the immune system to be adequately trained to regard the allergen as harmless. Furthermore, it is likely that the timing of the first encounter with a particular food allergen is important as the immune system develops over time and this may affect how it responds to foods it encounters.
Consequently, the best time for an infant to be introduced to solid foods in order to avoid food allergies remains unclear. A recent review of available studies suggested that early solid feeding (before 4 months of age) might increase the risk of eczema but probably not other allergic diseases. On the other hand, a number of scientists have recently suggested that introducing foods, particularly allergenic foods, too late may increase the risk of eczema and other allergic diseases.

Until recently an American expert group recommended no solid food until 6 months of age with a further delay for high risk infants in the introduction of cow’s milk until 1 year of age, no hen’s egg until 2 years of age, and avoidance of peanut, tree nuts, and fish until 3 years of age. The American expert group has now revised its guidelines and no longer recommends delaying the introduction of allergenic foods beyond 4-6 months which is in line with the advice of a European expert group. The European expert group does, however, recommend to avoid early (before 4 months of age) and late (after 7 months of age) introduction of gluten to reduce the risk of wheat allergy and coeliac disease. 7 out of the 18 surveyed countries still recommend delaying the introduction of specific allergenic foods despite of the limited research in the area. Whether this practice is beneficial or might even increase the risk for food allergy is currently not known.

**Use of supplements to change the microorganisms of the gut**

As foetuses we have a sterile gut. During birth and rapidly thereafter, bacteria and other microorganisms from the mother and the surrounding environment colonise the infant gut. Healthy children and adults end up with hundreds of different species and several kilograms of beneficial bacteria in their guts. Research suggests that the microorganisms are involved in a range of useful functions, including aiding the gut immune system to recognise food allergens as harmless.

It has been noted that allergic and non-allergic infants have different mixtures of bacteria in their gut. Researchers have therefore tried to prevent allergy by changing the mixture of bacteria in the guts of infants. This can be achieved in two ways; the ingestion of **prebiotics**, which are food substances intended to promote the growth of beneficial bacteria in the gut, or secondly the ingestion of **probiotics**, which are live beneficial microorganisms such as *Lactobacillus* and *Bifidobacterium* bacteria. Human breast milk provides a special type of sugar that does not provide nutrition but promotes the growth of the beneficial *Bifidobacterium* bacteria in the gut. Manufacturers are now increasingly adding both pre- and probiotics to infant formula in an effort to make the bacteria found in a formula fed baby’s gut be more like the bacteria found in the gut of a breast fed baby.

Some of the studies looking at the effect of pre- or probiotics in high risk infants have failed to demonstrate any benefits. In other studies with pre- or probiotics, the infants developed less atopic dermatitis (a form of eczema which may be triggered by food allergy). The results from the many studies probably differ because the study designs vary a lot. The infants have been fed various types of pre- or probiotics at different ages, doses and durations. In some of the studies the mothers of the infants have also eaten pre- or probiotics during pregnancy.
We need more research in the area before recommendations for allergy prevention can be made. No countries have included the use of pre- or probiotics into their infant feeding recommendations. None-the-less, numerous infant milk manufacturers incorporate both pre- and probiotics into specialized formulas to try to mimic the effect of breast milk.

**Research within EuroPrevall on infant feeding and allergy prevention**

More than 12,000 newborns from 9 different countries in Europe will participate in a EuroPrevall study that will investigate the occurrence of food allergies in the first 2½ years of life. The researchers will interview the mothers regularly e.g. about how they have fed their infant. Any infant thought to have a food allergy will be allergy tested. The 9 different countries participating in the study cover a range of different cultures and climates in Europe. The researchers will see if the occurrence of food allergy is the same in all countries. If differences do exist the researchers will explore whether the differences can be explained by, for example, different eating habits or pollen exposure. The EuroPrevall study with newborns is the most comprehensive investigation of food allergies in the first years of life to date. The study will demonstrate whether mothers have followed their national recommendations for allergy prevention. Research results from EuroPrevall as well as other studies will hopefully also lead to improved knowledge about infant feeding and allergy prevention and thus more consistency in the different national guidelines.

The above text is based on the paper:


*EuroPrevall is an EU-funded project about food allergy. The primary objective of EuroPrevall is to improve the quality of life for all food allergic consumers. To meet that objective EuroPrevall will conduct research to obtain information that we currently lack. EuroPrevall will also develop the tools necessary to manage food allergies more effectively. The 63 partners from 25 different countries include some of the leading allergy research organisations in Europe as well as clinical, patient, and industrial organisations. Visit [www.europrevall.org](http://www.europrevall.org) for more information on the project.*