



'Does my child have a food allergy?'

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Key points

- IgE mediated food allergy usually presents within 30 minutes of exposure to the trigger food.
- Most food allergy reactions are mild.
- Most children with mild atopic dermatitis do not have a true food allergy. Treating the underlying skin condition is still the mainstay of treatment in these children.
- Dietary manipulation is complicated and should be managed in conjunction with a specialist and dietitian.
- Optimal treatment of atopic conditions should be ensured in children with food allergies.
- Asthma is a risk factor for a severe food-related allergic reaction.

Avoidance, education about management of an acute reaction and optimal treatment of other atopic conditions, particularly asthma, are the mainstays of treatment of food allergy in children. Guidelines for the prevention of food allergy have changed recently.

Food allergy is an increasingly common problem that affects approximately one in 20 children in Australia.¹ Furthermore, the incidence of peanut allergy has undergone a 100% increase over the past 10 years.^{2,3}

This article discusses the several food-related immune reactions that affect children, with emphasis on IgE mediated allergies. Management strategies for the allergy and possible anaphylactic reactions are included, as is information about preventative strategies, the guidelines for which have changed over the past year.

DEFINING FOOD ALLERGY

A food allergy is an adverse reaction to a generally harmless substance within a food (usually a protein) that is mediated by the immune system. There are essentially three main types of food allergy: IgE mediated; IgE and non-IgE mediated; and non-IgE mediated.

IgE mediated food allergy

IgE mediated food allergy refers to immediate type hypersensitivity reactions that occur because specific IgE against that particular allergen is produced.

Theoretically, on first exposure to the allergen, the body recognises this protein as foreign and plasma cells produce IgE directed against the allergenic component of that protein. The IgE then sits on the surface of mast cells that are located in various tissues of the body, including the skin, lining of the lungs and mucosa. On next exposure, the allergen cross-links the specific IgE molecules, resulting in a release of granules from the mast cell. The granules contain an inflammatory soup that includes chemicals such as histamine. These act on the end organs, such as blood vessels, bronchioles and mucosal tissues, resulting in the symptoms and signs of an acute allergic reaction (Figure 1).

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FOODS IMPLICATED IN FOOD ALLERGIES

Cow's milk, egg, peanut, tree nuts, fish, shellfish, soy and wheat cause more than 90% of food allergies in children. Sesame is also emerging as an increasingly prevalent allergen.

It is important to note that any food is potentially allergenic. There are literally thousands of case reports that implicate a wide range of foods, from fruits and vegetables to different herbs and spices, as the cause of allergic reactions and even anaphylaxis. Around 90% of food-related anaphylaxis is caused by peanut, tree nuts or seafood. Cow's milk and egg are implicated as leading causes of anaphylaxis in young children.⁴

FOOD ALLERGIES

Oral allergy syndrome (IgE mediated)

Some patients with seasonal allergic rhinitis/conjunctivitis experience itch and irritation of the tongue, mouth and throat after ingestion of some fresh fruits and vegetables. Most of these patients are allergic to cross-reactive proteins common to some pollen and foods, and the condition is known as oral allergy syndrome. It is usually a mild disorder but more severe symptoms may occur. Usually the treatment involves either avoiding the food or eating it in the cooked form (if tolerated).

Atopic dermatitis and food allergy (IgE and non-IgE mediated)

Many parents perceive that food allergy is the underlying cause of their child's atopic dermatitis and will try vigilantly to pinpoint the cause. Evidence would suggest that only about 40% of children with moderate to severe atopic dermatitis have a true food allergy.⁵

Delayed type reactions to foods can occur in patients with atopic dermatitis and are not primarily IgE mediated. A period of elimination of potentially allergenic foods may be trialled by specialists in conjunction with dietitians in these patients. However, these diets are difficult and may not yield results.

Severe allergic reactions have been reported on re-exposure of children to foods removed from their diet for prolonged periods of time.



Figure 1. Most children with food allergy have cutaneous symptoms such as urticaria before they develop more severe symptoms.

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It is important to remember that the child's underlying nutrition is of great importance and both physical and emotional problems can occur due to restricted diets.

In managing children with atopic dermatitis, treating the underlying skin disorder with emollients, appropriate topical corticosteroids and, in some cases, antihistamines and/or antibiotics is the most important intervention.

Eosinophilic oesophagitis (probably IgE and non-IgE mediated)

In a population-based study performed from 2000 to 2003, Noel and colleagues reported the annual incidence of paediatric eosinophilic oesophagitis was approximately one in 10,000 for patients aged up to 19 years. However, the rate of eosinophilic oesophagitis is increasing and it is probably under-recognised.⁶

The condition usually occurs in people with atopic diseases. In children, it tends to present as severe oesophageal reflux unresponsive to conventional medications. In older children, epigastric pain, dysphagia of solid foods or impaction is sometimes reported. The aetiology is unknown and diagnosis is based on characteristic microscopic abnormalities as well as history.



Figures 2a and b. Mild to moderate food allergy. a (left). Lip and mouth swelling. b (above). Urticaria.

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Endoscopy is therefore necessary to confirm the diagnosis. Management is usually conducted in conjunction with gastroenterologists, immunologists and dietitians. It may involve dietary restriction as well as anti-inflammatory medications, including high-dose topical corticosteroids (such as fluticasone propionate aerosol) that are swallowed rather than inhaled for local application to the oesophagus.

Food protein-induced enterocolitis syndrome (non-IgE mediated)

Food protein-induced enterocolitis syndrome (FPIES) is an increasingly recognised condition that usually presents in babies under 1 year of age. The most common foods that trigger FPIES are cow's milk and soy protein. In acute presentations, the child ingests the food and typically within 1.5 to two hours vomits profusely and may become shocked. It is frequently misdiagnosed as sepsis or bowel obstruction. In chronic forms, young infants exposed to these proteins on a daily basis typically manifest symptoms of daily vomiting, diarrhoea, failure to thrive and, occasionally, melaena. There is a high rate of reactivity to both cow's milk and soy in such infants. Symptoms resolve with substitution of

the cow's milk or soy protein with an amino acid-based infant formula.

Solid food FPIES (such as to rice and other infant foods) usually has a more acute presentation and does not often occur on the first known exposure to the food.

The pathophysiology of FPIES is unclear but skin tests are negative. Diagnosis is based on history and management involves strict avoidance of the food. Cow's milk and soy FPIES usually resolve between the ages of 1 and 2 years and resolution is established by formal supervised food challenge. The rate of resolution of solid food FPIES is variable.

Cow's milk- or soy-induced proctocolitis (non-IgE mediated)

Cow's milk- or soy-induced proctocolitis is a condition of young babies exposed to cow's milk or soy either directly or through breast milk. Infants are irritable and have blood or mucous in their stool typically some hours after the ingestion of these proteins. Diagnosis is through history; skin tests are usually negative.

Treatment involves removing these foods from the infant's (or mother's) diet. Both cow's milk and soy must be removed because of the high rate of

cross-reactivity. Amino acid-based infant formulas should be used if breastfeeding is discontinued. The condition usually resolves by the age of 1 year.

FOOD INTOLERANCE

Food intolerance is a general term describing any reaction to food that does not involve the immune system. Food intolerance can have the following causes:

- pharmacological mechanisms – for example, a reaction caused by particular chemicals in the food; these chemicals can be naturally occurring (such as caffeine) or additives (such as monosodium glutamate)
- metabolic mechanisms – for example, those caused by an enzyme deficiency, such as lactose intolerance
- toxic reactions – for example, caused by food poisoning
- idiopathic.

Although some symptoms of food intolerance are similar to those of food allergy, food intolerance usually is not life threatening and results in milder symptoms than a true food allergy.

Food intolerance is often diagnosed by an elimination diet. The removal of suspect foods from a patient's diet to see if symptoms disappear and then the reintroduction of foods one at a time in an attempt to directly link symptoms with a specific food is often done under supervision (specialist and dietitian), depending on the original symptom complex.

Skin prick tests or specific IgE measurements are not appropriate or helpful for the diagnosis of food intolerance.

DIAGNOSING IGE MEDIATED FOOD ALLERGY

Most cases of IgE mediated food allergy are fairly easy to recognise. Symptoms generally appear within 30 minutes of ingesting the allergenic food and can occur on the first known exposure to that food.

Most food allergies are relatively mild. The symptoms and signs of a mild to

TABLE 1. SYMPTOMS AND SIGNS OF FOOD ALLERGY IN CHILDREN**Mild to moderate allergic reaction**

- Urticaria
- Lip/mouth swelling (angioedema)
- Vomiting/diarrhoea/abdominal pain
- Rhinitis

Severe allergic reaction or anaphylaxis

- Difficulty breathing/noisy breathing
- Swelling of the tongue
- Swelling or tightness in the throat
- Difficulty talking and/or a hoarse voice
- Wheeze or persistent cough
- Loss of consciousness and/or collapse
- Young children may become pale and floppy

moderate allergic reaction may include one or more of urticaria, lip/mouth swelling (angioedema), vomiting/diarrhoea/abdominal pain and rhinitis (Figures 2a and b; Table 1).

Signs of a severe allergic reaction or anaphylaxis include any one or more of difficulty breathing, noisy breathing, swelling of the tongue, swelling or tightness in the throat, difficulty talking and/or a hoarse voice, wheeze or persistent cough, and loss of consciousness and/or collapse (Table 1). Affected young children may become pale and floppy. More than 90% of children will have cutaneous symptoms before they develop more severe symptoms; however, the reaction can evolve very rapidly.

The diagnosis may be less obvious when the trigger food is not easy to identify on history or the symptoms are less defined. Food allergy is rarely a trigger for chronic rhinoconjunctivitis.

Tips for GPs about diagnosing food allergy are given in the box on this page.

TIPS FOR GPs: DIAGNOSING FOOD ALLERGY IN CHILDREN

- Take a detailed history at the time of presentation – this is likely to be very helpful later.
- Recognise that not all food allergy is IgE mediated.
- Counsel parents about the primary importance of treating the skin in atopic dermatitis rather than manipulating diets without evidence.
- Counsel parents about the relevance of allergy tests to their child's condition – this can help prevent unnecessary anxiety and investigations.
- If ordering *in vitro* specific IgE tests, specify which allergen is to be tested; avoid ordering 'food panels'.

INVESTIGATING PATIENTS WITH FOOD ALLERGY

Several tests are available for identifying the likely cause of a food allergy.

Skin prick tests

Skin prick tests have the advantage of being more sensitive than blood tests for allergen-specific IgE. They provide immediate results, are usually well tolerated and rarely cause severe side effects. If an allergy to a fresh fruit, vegetable or a processed food is suspected, it is helpful for the patient to bring a sample of that food to the specialist appointment for fresh food testing. Antihistamines should be stopped for at least three to five days before testing.

Skin prick tests can be performed in patients of any age but require careful interpretation in young infants. The risk of a more severe reaction to a skin test is higher in a young baby (under 1 year of age).⁷

Skin prick testing has no role in confirming suspected reactions to food additives.

Blood tests for allergen-specific IgE (RAST)

The original immunoassay technology for detecting allergen-specific IgE in the serum – radioallergosorbent testing (RAST) – has been superseded by enzyme and fluorescent-based assays and the accepted term is now '*in vitro* specific IgE testing'.

If skin prick testing is not available or there is no clear skin on which to perform the test, or the patient cannot stop their antihistamines, an *in vitro* specific IgE test may be useful. Specific antigens should be ordered rather than 'food panels'. Results of food panels are confusing and parents often think that all the foods in the panel are to be eliminated from the diet if a result is positive.

It is important to note that the magnitude of a skin test reaction or blood test response correlates with the likelihood of the patient having a clinical allergy to that food but not with the severity of the reaction. A positive skin test or *in vitro* test signifies allergic sensitisation and not necessarily clinical allergy.

Total IgE levels

The total IgE value is often raised in people with allergies and/or eczema. However, measurement of the total IgE level does not help in the diagnosis of a food allergy.

Oral food challenges

The gradual feeding of a test food under close supervision and observation to see if it is tolerated is sometimes performed to prove a diagnosis of food allergy when the history is not entirely clear. An oral food challenge may also be used to determine if a food allergy has resolved.

Oral food challenges must always be performed by experienced clinicians who have the ability to recognise and manage

anaphylaxis. Extensive resuscitation equipment should be readily available.

Unproven methods

Examples of unproven methods of assessing food allergy include cytotoxic food testing, kinesiology, Vega testing, electrodermal testing, pulse testing, reflexology and hair analysis. These tests have not been scientifically validated and may lead to dangerous avoidance strategies.⁸

A patient information sheet entitled *Food Allergy* and containing extensive information about these tests (under the heading 'Unorthodox so called tests for food allergy') is available from the Australasian Society of Allergy and Immunology (ASCIA) website (http://www.allergy.org.au/images/stories/aer/infobulletins/2010pdf/AER_Food_Allergy.pdf).

THE NATURAL HISTORY OF FOOD ALLERGY

The common wisdom is that most common childhood food allergies resolve before adulthood, and in the community this is still the most likely scenario. Between 70 and 80% of children will outgrow milk allergy by the age of 3 years and egg allergy is commonly outgrown by the early school years (between 6 and 8 years of age). Unfortunately, only around 20 to 25% of children will outgrow peanut, tree nut or seafood allergy, and a number of these may lose their tolerance to the allergen if continued regular exposure to the allergen does not occur.

In patients managed in tertiary referral centres, it appears that the rate of outgrowing allergies is much slower than previously thought. However, most will still outgrow egg and milk allergies by their teenage years.

MANAGEMENT OF FOOD ALLERGIES

The management of patients with food allergy involves avoiding the food allergens. Accidental ingestions of the allergenic food are not uncommon and other pitfalls of food avoidance include

TABLE 2. REFERRAL OF CHILDREN WITH FOOD ALLERGY

- All cases of suspected anaphylaxis
- Any child at high risk of anaphylaxis, e.g. children with asthma as well as food allergy
- Milder cases of suspected food allergy where the cause cannot be identified with certainty
- A suspicion of food protein-induced enterocolitis syndrome or eosinophilic oesophagitis
- Very young children (under 2 years of age) in whom tests are likely to be more difficult to interpret and nutritional issues are especially important
- If more than one staple food is to be eliminated (advice from dietitian also required)

nutritional inadequacy as well as psychological difficulties.

If a major staple food such as cow's milk is removed from the child's diet, advice from a dietitian is important in order to assess adequate nutritional intake. Children with gross calcium deficiencies and even malnutrition are frequently seen in specialist clinics after being placed on restricted diets.

Providing clear written information to patients and their families about how to avoid allergens is helpful because food labelling can be confusing (see the box on resources on page 26).

Although there are many trials under way around the world seeking to find a better solution for the management of food allergies, these therapies are not yet ready for clinical use. These trial therapies include oral desensitisation.

Situations when patients should be referred to an allergist or clinical immunologist are listed in Table 2. Some tips for GPs when managing children with food allergy are given in the box on this page.

TIPS FOR GPs: MANAGING CHILDREN WITH FOOD ALLERGY

- Identify the potential allergen or allergens.
- Provide the tools and knowledge to avoid the allergen.
- Ensure adequate nutrition.
- Prescribe emergency medications if appropriate and educate the family how to recognise and manage an allergic reaction.
- Provide optimal treatment for the concurrent atopic diseases.

ANAPHYLAXIS

Anaphylaxis is a serious allergic reaction with rapid onset involving one or more systems of the body. Although the true prevalence of anaphylaxis is not known, in an Australian study published in 2000 parents reported that one in 170 preschool children had suffered at least one episode of anaphylaxis of any cause.⁹ The rate of anaphylaxis appears to be increasing but fatalities are extremely rare and the death rate has remained stable over the past 10 to 15 years.

There is currently no scientific evidence to suggest anaphylaxis can occur from casual skin contact with an allergen.

Risk factors for anaphylaxis

There is no test that can predict which child with a food allergy will experience anaphylaxis. There are, however, several epidemiological factors that have been found to be associated with anaphylaxis fatalities and/or may favour the provision of a child with an adrenaline autoinjector. These include:

- a history of previous anaphylaxis
- asthma
- association with a particular allergen (peanut or tree nut, especially cashew)
- having a previous significant reaction to a very small amount of that protein
- the child's age – for example, the risk

PREVENTING FOOD ALLERGY IN CHILDREN¹²**Infant feeding advice**

The Australasian Society of Allergy and Immunology (ASCIA) guidelines for infant feeding to prevent food allergy, *Infant Feeding Advice*, are summarised below.¹²

- Breastfeeding is recommended for at least six months.
- If not breastfeeding or supplemental formula feeds are needed, partially hydrolysed cow's milk formulas (commonly referred to as hypoallergenic or HA formulas) are recommended for the first four to six months of life for infants at high risk of allergic disease (history of allergy in parents or siblings). These formulas are not suitable if the child already has a diagnosed cow's milk allergy. Standard cow's milk formulas may be used in infants not at high risk.
- Introduce solid foods from around 4 to 6 months of age. There is no convincing evidence to suggest that delaying the

introduction of solid foods beyond 6 months of age will protect against the development of allergic disease.

- Avoidance of potentially allergenic foods is not recommended. Previous guidelines suggested avoiding allergenic foods such as cow's milk and egg until 12 months of age but there is no conclusive evidence to support delaying the introduction of foods beyond 6 months of age.

Other advice

- Children should not be exposed to cigarette smoke.
- Parents should not smoke during pregnancy.
- Mothers should not restrict their diets during pregnancy. Not only is this unhelpful in preventing allergic disease but it may also cause nutritional difficulties in the mother and the child.

of fatality is higher in adolescents and young adults; very few deaths are reported due to anaphylaxis in children under 5 years of age

- access to emergency medical care.

There is also increasing evidence that concurrent presence of other atopic diseases is associated with increased severity of signs during a food-related allergic reaction.

Management of anaphylaxis

If a child is considered at risk of anaphylaxis then an emergency adrenaline auto-injector device should be prescribed. There are two devices currently available on the Pharmaceutical Benefits Scheme (PBS). ASCIA recommends that the lower dose (0.15 mg adrenaline) junior versions of these devices be prescribed for children weighing between 10 and 20 kg and the higher dose (0.30 mg adrenaline) versions for individuals weighing over 20 kg.¹⁰

(Note that the approved product information for the two autoinjectors state that the 0.15 mg adrenaline dose versions are intended for children weighing between 15 and 30 kg, and the 0.30 mg adrenaline dose versions for children and adults weighing more than 30 kg.) The two devices have different administration techniques and patients should be specifically trained in the use of the device prescribed for them.

An action plan should be provided when an adrenaline autoinjector is prescribed (*ASCIA Action Plan for Anaphylaxis*, available from the ASCIA website, <http://www.allergy.org.au/content/view/10/3>). Details of these action plans and adrenaline autoinjector prescribing guidelines were published in the September 2010 issue of *Medicine Today*.¹¹

Although it is not within the scope of this article to discuss anaphylaxis management in detail, the first line of

USEFUL RESOURCES**Australasian Society of Clinical Immunology and Allergy (ASCIA) – <http://www.allergy.org.au>**

The ASCIA website provides up-to-date resources for doctors and their patients, including information about anaphylaxis action plans, infant feeding advice and food allergies (general and to specific foods). The site also has an e-learning package for parents to provide information about the management of anaphylaxis.

- **Adverse food reactions.** All the available information sheets on adverse food reactions are listed at: <http://www.allergy.org.au/content/view/290/235/>
- **Anaphylaxis.** All the available information sheets on anaphylaxis, including action plans and information on adrenaline autoinjectors, are listed at: <http://www.allergy.org.au/content/view/10/3>

The Children's Hospital at Westmead – <http://www.chw.edu.au/parents/factsheets/#allergy>

The website of the Children's Hospital at Westmead, Sydney, provides fact sheets for parents on allergen avoidance and other useful advice about food allergy.

Anaphylaxis nurse educators

Nurse educators are available to visit schools in New South Wales, Western Australia and parts of Queensland to educate teachers about the management of anaphylaxis.

management in the acute setting is intramuscular adrenaline 1:1000 at a dose of 0.01 mL/kg to a maximum of 0.5 mL into the lateral thigh. This should be repeated after five minutes if the patient has not improved. The patient should be placed

in a position of comfort with his or her legs elevated and oxygen should be administered. They should not be allowed to stand.

ALLERGY PREVENTION

Prevention of allergic disease including food allergy remains an active but as yet unresolved area of research. In 2008, ASCIA published infant feeding guidelines that provide an approach to the prevention of food allergy in children at high risk (that is, those with a first-degree relative with atopy).¹² The introduction of solid foods at age 4 to 6 months is now recommended, as is also that no particular allergenic foods need to be avoided, rather than the previous recommendation to delay solid feeding and to restrict potentially allergenic foods. A patient information sheet on infant feeding is available from the ASCIA website (http://www.allergy.org.au/images/stories/aer/infobulletins/2010pdf/ascia_infant_feeding_advice_2010.pdf).

The current guidelines for infant feeding to prevent food allergy are summarised in the box on page 26.

USEFUL RESOURCES

Sources of information sheets and other resources for both patients and GPs are listed in the box on page 26.

CONCLUSION

The rate of food allergy is increasing, as is the rate of anaphylaxis to food. Thankfully most food allergy is mild and fatalities are rare.

GPs play a vital role in the management of food allergy because they are often the first to see the child after an allergic reaction. It is important to take a detailed history and to provide this to the specialist if referral is appropriate. Treating coexisting atopic conditions is helpful in the overall management of the condition. Reassuring parents and discouraging unsupervised dietary restriction will help optimise the child's

nutritional status. Recognising anaphylaxis and the risk factors can be life-saving. Prescribing adrenaline autoinjectors appropriately and educating parents in using the devices is a service that GPs can provide in conjunction with a specialist. **MT**

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