

History taking the key to diagnosing food allergy in children

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What are the main food allergies in children?

Which children should be referred?

What are the evidence-based management approaches?



FOOD ALLERGY HAS INCREASED IN PREVALENCE IN RECENT YEARS WITH CURRENT ESTIMATES

suggesting 5-8% of children in the UK have at least one food allergy.¹

Allergy to milk and egg are the two most prevalent food allergies in children. They are typically diagnosed in infancy and carry a good prognosis with the majority of cases resolving before the child reaches school age.

The other allergies may present later in childhood but once present are more likely to persist.

A major risk factor for food allergy is thought to be sensitisation to food allergens present in the environment through the skin. There is a large body of evidence to suggest that eczema in early life is associated with food allergy.³ The presence of eczema in the first few months of life is a strong risk factor for the development of IgE mediated

allergy. There is evidence of a causal link between early onset severe and widespread eczema that is unresponsive to moderate topical steroids and the development of IgE mediated food allergy, in particular peanut allergy.^{2,3}

The Food Standards Agency specifies that 14 common allergens should be listed (in bold) on food products. These include nine of the ten most common allergens in the UK, see table 1, p24.⁴

MECHANISMS

Allergic reactions can be classified as either IgE mediated (immediate) and non-IgE mediated (delayed) reactions.

IgE mediated reactions occur within minutes (usually less than 30 minutes) of allergen ingestion and are caused by mast cell degranulation as the allergen binds to IgE on the surface of the cell. This in turn leads to histamine release and causes symptoms such as rash,

hives, itching and swelling, abdominal pain and vomiting.

IgE mediated reactions can become systemic and anaphylaxis can occur if there is cardiorespiratory involvement with symptoms such as cough, wheezing, lethargy or loss of consciousness. Anaphylaxis is a life-threatening event and must be treated promptly with intramuscular adrenaline.

Non-IgE mediated reactions tend to occur later than IgE mediated reactions, and the mechanism of action is less clearly defined. Symptoms usually occur between 2 and 72 hours after ingestion of the allergen and can be cutaneous, such as a rash or a flare of eczema, or gastrointestinal, such as vomiting, diarrhoea, blood in the stool, abdominal pain or colic in infants.

Non-IgE mediated allergy can also present with chronic symptoms of eczema, reflux, colic, and less commonly faltering growth or food aversion. >>

SPECIAL REPORT

FOOD ALLERGY IN CHILDREN

PRESENTATION

The range of presentations is wide, as outlined in table 2, below. A careful allergy focused history (NICE and iMAP have produced helpful guidance on history taking^{5,6}) examining time to onset of reaction and symptoms, can usually establish if the presentation is IgE or non-IgE mediated.

The baby with feeding difficulties is a common presentation to primary care, and cow's milk protein allergy is an important differential diagnosis, although a careful history must be taken to differentiate it from colic, reflux or other causes of poor feeding. The iMAP guideline for milk allergy in primary care has recommendations on assessing babies with potential milk

allergy (www.allergyuk.org/health-professionals/mapguideline).⁶

Once weaning has started a child will usually present with a suspected reaction following ingestion of a food. The timeframe is important as parents may often incorrectly attribute symptoms to a food eaten several hours or days earlier when a further, but unconsidered, trigger occurred in the interim. In younger children, intercurrent illness is also a common precipitant of rashes which can be blamed on a food allergy. It is important to take a detailed history of the ingredients in the meal eaten if the allergen is unclear, looking up the components of processed foods on the internet can help with this. Screening for other foods eaten and tolerated can help eliminate suspected allergens in a food which triggered a reaction.

diagnostic doubt as to the causative allergen from the history given. However, both tests can return false-positive or false-negative results and must be interpreted with caution. A strong clinical history of a reaction cannot simply be overruled by a negative blood or skin prick test, and in these cases an in-hospital food challenge may be appropriate.

Allergy testing may have a place in primary care to provide more evidence for a suspected diagnosis, but only in combination with good history taking. Undertaking extensive specific IgE tests for foods not implicated by the history can create more problems than it solves as a raised result in a food eaten and tolerated is unlikely to be clinically relevant and can lead to unnecessary dietary exclusion. Diagnostic tests are only used in the diagnosis of IgE mediated allergy, and are not useful in general for patients with symptoms of non-IgE mediated allergy.

If non-IgE mediated milk allergy is suspected in an infant the practitioner can suggest the mother excludes milk protein from her own diet, if breast feeding, or tries a hypoallergenic formula if the infant is bottle fed. This should be tried for 2-4 weeks, and it is important to re-challenge the baby to cow's milk protein after this period to see if the symptoms recur or worsen, as this will confirm the diagnosis. The iMAP guideline also contains a management algorithm for primary care.⁶

Table 1

Common food allergies

IgE mediated	Non-IgE mediated
● Milk	● Milk
● Egg	● Soya
● Soya	● Egg
● Wheat	● Wheat
● Peanut	
● Tree nuts	
● Sesame	
● Fish	
● Shellfish	
● Kiwi	

'It is vital to ask about signs and symptoms of anaphylaxis even if medical attention was not sought...'

It is vital to ask about signs and symptoms of anaphylaxis even if medical attention was not sought, as this does not necessarily mean that the reaction was not severe.

'... as this does not necessarily mean that the reaction was not severe'

A host of other diagnostic tests for allergy such as specific IgG testing, hair testing and vega testing, may be offered by complementary therapists, and are available via the internet, but there is no evidence that any of these tests have a place in the diagnosis of food allergy.

CONFIRMING DIAGNOSIS

The best way to diagnose allergy is with a good history although parents will often approach their GP to ask for allergy testing. The NICE guideline on food allergy in children and young people and the Royal College of Paediatrics and Child Health allergy care pathways are useful guides.^{5,7}

Skin prick testing and specific IgE testing are commonly used in secondary and tertiary care in addition to history taking to aid diagnosis for immediate type allergies, particularly if there is

Table 2

Symptoms of food allergy

IgE mediated	Non-IgE mediated
Dermatological	Dermatological
● Pruritus	● Pruritus
● Erythema	● Eczema
● Urticaria	
● Angioedema	Gastrointestinal
Gastrointestinal	● Gastro-oesophageal reflux
● Abdominal pain	● Colic
● Nausea and vomiting	● Abdominal pain
	● Constipation
Respiratory	● Diarrhoea
● Cough	● Blood or mucus in stool
● Wheeze	● Vomiting
● Sneezing	● Food aversion
● Rhinitis and rhinorrhoea	● Faltering growth
Cardiovascular	
● Change in behaviour	
● Lethargy	
● Loss of consciousness	
● Hypotension	

Table 3

Indications for prescribing adrenaline auto-injectors

Absolute indications	Relative indications
● Previous episode of anaphylaxis	● Peanut/tree nut allergy
● Comorbid asthma	● Reaction to trace amount of allergen
	● Remote location
	● Parental anxiety
	● Adolescent patient

key points

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Allergy to milk and egg are the two most prevalent food allergies in children. They are typically diagnosed in infancy and carry a good prognosis with the majority of cases resolving before the child reaches school age. Other allergies may present later in childhood and are more likely to persist. Severe eczema in early life is a major risk factor for allergy as defects in the skin barrier allow allergens to penetrate and provoke an immune response resulting in sensitisation. There is evidence of a causal link between early onset severe and widespread eczema that is unresponsive to moderate topical steroids and development of IgE mediated food allergy, in particular peanut allergy.

Allergic reactions can be classified as either IgE mediated (immediate) and non-IgE mediated (delayed) reactions. IgE mediated reactions occur within minutes (usually < 30 minutes) of allergen ingestion and are caused by mast cell degranulation as the allergen binds to IgE on the surface of the cell. This leads to histamine release and causes symptoms such as rash, hives, itching and swelling, abdominal pain and vomiting. In non-IgE mediated reactions symptoms usually occur 2-72 hours after ingestion of the allergen and can be cutaneous, i.e. a rash or a flare of eczema, or gastrointestinal, such as vomiting, diarrhoea, blood in the stool, abdominal pain or colic in infants. The mechanism of action is less clearly defined.

The best way to diagnose allergy is with a good history. Skin prick testing and specific IgE testing are commonly used in secondary and tertiary care in addition to history taking to aid diagnosis for immediate type allergies, particularly if there is doubt as to the causative allergen from the history given. However, both tests can return false-positive or false-negative results and must be interpreted with caution.

Ingestion of allergens during pregnancy or breast feeding has no impact on the prevalence of allergy in infants and so it is recommended that mothers should not alter their diet for this purpose. If non-IgE mediated milk allergy is suspected in an infant the practitioner can suggest the mother excludes milk protein from her own diet if breast feeding or tries a hypoallergenic formula if the baby is bottle fed. This should be tried for 2-4 weeks, and it is important to re-challenge the baby to cow's milk protein after this period to see if the symptoms recur or worsen. The EAT study showed that infants who were weaned early and exposed to egg and peanut had a significant reduction in allergy to both foods.

Avoidance of the allergen is still the mainstay of management, and once an allergy has been confirmed patients should be referred to a dietitian for advice on exclusion diets and nutritionally replete alternatives. Symptoms of a mild to moderate allergic reaction can be managed with an oral antihistamine, given at the first sign of a reaction. Symptoms suggestive of anaphylaxis should be treated with adrenaline without delay, emergency services should be called and the child admitted to hospital.

'Undertaking extensive specific IgE tests for foods not implicated by the history can cause more problems than it solves'

PREVENTION

There is evidence to suggest that the ingestion of allergens in pregnancy or breast feeding has no impact on the prevalence of allergy in infants and so it is recommended that mothers should not alter their diet for this purpose.⁸

As mentioned earlier, severe eczema in early life is a major risk factor for the development of allergy as defects in the skin barrier allow allergens to penetrate and provoke an immune response resulting in sensitisation.³ There is evidence to show that vigorous treatment of eczema in infants reduces future allergy risk.³ Hence, eczema should be managed proactively with application of emollients and steroid cream if necessary.

In the past five years two seminal papers have changed our understanding of allergy in early life. The Learning Early About Peanut (LEAP) study hypothesised that the early inclusion of peanut-based snacks in the weaning diet had a protective effect, and this was corroborated by a clinical trial which randomised high-risk children (with severe eczema or egg allergy) to either eat or avoid peanut from early life.² There were significantly lower levels of allergy in the consumption group (10.6%) compared with the avoidance group (35.3%), and a follow-up study demonstrated that this tolerance persisted, even if these patients avoided peanut for a whole year, after five years of regular consumption.⁹

The Enquiring About Tolerance (EAT) study randomised exclusively breast-fed infants selected to represent the general population to either start consuming six allergenic foods (milk, egg, wheat, fish, peanut and sesame) from three months or to wean from six months in accordance with national guidance.¹ Many parents in the consumption group had difficulty following the early introduction protocol and the intention to treat group did not have a rate of allergy significantly different from the

standard introduction group (5.6% vs 7.1%). However, when the protocol adherent groups were compared the infants who were weaned early showed a significant reduction in allergy to egg (1.4% vs 5.5%, $P = 0.009$) and peanut (0% vs 2.5%, $P = 0.003$), although not to the other four foods tested. The study showed that early weaning, although difficult to achieve, was safe for infants and has helped lead to a relaxation of the advice to parents regarding weaning from 4-6 months.¹⁰

MANAGEMENT

Avoidance of the allergen is still the mainstay of management in allergic disease, and once an allergy has been confirmed patients should be referred to a dietitian for advice on exclusion diets and nutritionally replete alternatives to any foods being avoided. Patients with milk and egg allergy can often tolerate their allergen in the baked form, and there is no reason to exclude this if the child is already eating an adequate portion regularly, i.e. at least twice a week.¹¹ It is important to check the quantity eaten if a parent claims the child is eating an allergenic food. If the allergen is a trace or low-level ingredient then it may be that the child is not consuming an adequate amount to trigger a reaction.

'The LEAP study hypothesised that early inclusion of peanut-based snacks in the weaning diet had a protective effect, and this was corroborated by a clinical trial'

Symptoms of a mild to moderate allergic reaction can be managed with an oral antihistamine, administered at the first sign of a reaction. No particular antihistamine has been shown to be more effective than the others. First-generation medications such as chlorphenamine are shorter acting and more sedating, whereas second-generation medications such as loratadine and cetirizine are longer acting and less sedating.¹²

Symptoms suggestive of anaphylaxis should be treated with adrenaline without delay, emergency services

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Table 4

Indications for referral to secondary/tertiary care

- History of anaphylaxis
- Patients with multiple food allergies
- Patients with asthma and food allergies
- Patients with poor growth caused by food restriction related to allergies
- Babies with severe eczema prior to weaning

should be called and the child admitted to hospital for a minimum of six hours to observe for signs of a secondary reaction, as per NICE guidance.¹³ The indications for adrenaline auto-injector prescription are listed in table 3, p24. Children should have four adrenaline auto-injectors, with two to be kept with the patient at all times (according to MHRA guidelines)¹⁴ and two to be stored at school.

The British Society for Allergy and Clinical Immunology (BSACI) has produced standardised allergy action plans which should be given to every child who has been diagnosed with a food allergy, see Useful information box, below, right.¹⁵ These plans give a step by step guide to the treatment of an allergic reaction, including dose of antihistamine and a pictorial guide on how to administer an adrenaline auto-injector. Different versions are available according to the type of auto-injector used.

Parents of school-age children should give a copy of the management plan and prescribed treatment (antihistamines, adrenaline and bronchodilator, if applicable) to the school. Legislation was passed in 2017¹⁶ to allow schools to purchase their own adrenaline auto-injector to be kept in school as a spare, in case of an emergency (www.sparepensinschools.uk).

The BSACI allergy action plans have a section for parents to sign to give consent for the school to use the spare adrenaline auto-injector if their child's own device is not available.

Immunotherapy for food allergies is often mentioned in the lay media and parents may ask about it in consultations. At present food immunotherapy is only available in the research setting.

Patients that should be referred to an allergist or a paediatrician with an interest in food allergy are listed in table 4, above.

CONCLUSION

Food allergy in children and awareness of the disease is increasing in the UK. Recent advances in research mean that we understand more about the extent of the problem and how better to manage these children.

Allergy component blood tests have been developed as individual proteins which trigger an immune response in allergenic foods have been identified. Research in this area is ongoing but in some foods such as peanut¹⁷ and hazelnut¹⁸ certain components have been shown to be associated with more severe primary allergic reactions, and others with milder local reactions such as oral allergy syndrome. Sensitisation to specific egg white proteins (ovomucoid) can be a useful marker of disease persistence.¹⁹ Currently, component allergen testing is mainly used in the secondary or tertiary care setting.

The development of evidence-based guidelines and education through professional societies, such as BSACI, empower GPs to manage children with simple food allergy in primary care and identify early those with more complex conditions who require onward referral to secondary care.

Competing interests

Ian Gregory has no competing interests. Adam Fox has received research funding from Danone and ALK-Abello and lecture/consultancy fees from Danone, Mead Johnson, Nestle Nutrition, Abbott, ALK-Abello, Mylan, Aimmune and DBV. Roisin Fitzsimons has no competing interests.

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timing of introduction of complementary foods, and hydrolyzed formulas. *Paediatrics* 2008;121(1):183-91

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Useful information

British Society for Allergy and Clinical Immunology

Allergy action plans for children www.bsaci.org/about/download-paediatric-allergy-action-plans

Spare Pens in Schools

www.sparepensinschools.uk

Allergy UK

www.allergyuk.org

Anaphylaxis Campaign

www.anaphylaxis.org.uk

Allergy Academy

www.allergyacademy.org

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