

Diagnosing and managing peanut allergy in children

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FIGURE 1
Skin prick testing

What are the mechanisms involved?

How should diagnosis be confirmed?

What are the management approaches?



PEANUT ALLERGY IS A COMMON DISEASE AND IS BECOMING AN INCREASING PUBLIC HEALTH BURDEN.

Sensitisation to peanut in the general UK population is around 3%. This translates to clinical allergy in around 1%, with 1 in 70 children in the UK affected.¹ The prevalence is thought to be rising.¹ Accidental exposures are frequent^{2,3} and nut allergies are the leading cause of fatal food allergic reactions.⁴

MECHANISM

Allergic reactions to peanuts are nearly always an immediate, type 1-mediated hypersensitivity response. Reactions arise due to the formation of IgE antibodies as a result of prior sensitisation to peanut proteins. On first exposure, the peanut protein

antigen is processed by an antigen presenting cell. Binding of the antigen to a T cell leads to activation and crosstalk between T and B cells resulting in the production of peanut-specific IgE antibodies.

‘Peanut allergy is rarely outgrown in older children and adults’

These circulating antibodies bind to the surface of mast cells and basophils via their IgE receptors. On re-exposure to peanut protein, the effector cells degranulate, leading to the release of pre-formed granules containing

histamine, tryptase and leukotrienes.

The typical physiological response associated with a type 1-mediated hypersensitivity reaction, e.g. smooth muscle contraction, mucous secretion, and vasodilatation, are driven by these mediators. These responses are typically rapid in onset and can lead to systemic effects i.e. anaphylaxis.

The initial route, dose, frequency and duration of peanut sensitisation is often not known.

Children react on what is apparently their first exposure. Therefore, it has been postulated that sensitisation may occur through one of several different routes: in utero;⁵ through breast milk;⁶ in eczematous children through a compromised skin barrier;⁷ or through low-dose environmental exposure e.g. inhalation.⁸

PRESENTATION

Peanut allergy most commonly presents in the first five years of life. More than 90% of nut allergic children will have a history of eczema, asthma, rhinitis or another food allergy e.g. egg or other nuts.

Typical symptoms and signs of IgE-mediated reactions to peanut are described in table 1, below. Symptoms develop within minutes of exposure.

This list is not exhaustive and

symptoms of allergic reactions in children can sometimes be more subtle as they are less able to describe their symptoms.

A change in behaviour, for example, becoming quiet or distressed can signify the onset of an allergic reaction. A persistent cough, change in voice or drooling suggest laryngeal involvement. Children may also spit out the offending food or refuse to eat it.

DIAGNOSIS

The clinical diagnosis of peanut allergy is made from a typical history in combination with clinical evidence of sensitisation i.e. the presence of peanut-specific IgE. Tests for specific IgE should only be carried out if there is a strong suspicion of allergy from the history, see figure 1, p21. Importantly, positive skin prick tests or positive serum specific IgE demonstrate sensitisation to a specific allergen, but alone are not proof that the allergen is the cause of the clinical symptom. The specificity of both tests depends on the clinical history taken prior to the testing, the pre-test probability.

‘The amount of peanut consumed is likely to be the major determinant of severity on each occasion’

Traditionally, a skin prick test wheal ≥ 3 mm or specific IgE > 0.35 kU/l are used to support a diagnosis of peanut allergy. Some studies have suggested various decision points above which the positive predictive value for the skin prick test and specific IgE are diagnostic of peanut allergy, even in the absence of a positive history. These vary between populations studied.⁹

Irrespective of the value of a positive skin prick test or serum specific IgE, it is important to remember that the magnitude of the result does not reflect the severity of a future reaction. No test is helpful for screening e.g. in siblings of peanut-allergic children.

Component resolved diagnostics may be used by specialists if additional information is required, for example if the history is not clear.

Major components in peanut allergy include Ara h 1, 2, 3, and 6 which are seed storage proteins associated with primary allergy to peanut. They are present in large amounts, heat stable and resistant to gastric digestion. The presence of Ara h 2-specific IgE suggests primary peanut allergy with the potential for more severe reactions.¹⁰ Food challenges can be performed in cases of uncertainty but are often unnecessary.

Table 1

Typical signs and symptoms of IgE-mediated allergic reactions (Adapted from NICE guideline CG116)⁹

System	Signs and symptoms
Cutaneous	● Erythema ● Acute urticaria: localised or generalised ● Acute angioedema: commonly lips, face and around eyes ● Pruritus
Upper respiratory	● Hoarse voice ● Stridor ● Persistent cough or throat clearing ● Sneezing, rhinorrhoea or nasal itching
Lower respiratory	● Wheezing ● Cough ● Dyspnoea
Gastrointestinal	● Angioedema: lips, tongue, palate ● Oral pruritus ● Nausea ● Emesis ● Diarrhoea ● Abdominal pain
Cardiovascular	● Hypotension ● Tachycardia ● Collapse
Neurological	● Altered mental status or change in behaviour

Table 2

Indications for prescribing adrenaline autoinjectors (adapted from EAACI position paper)¹⁴

Absolute	Relative
Previous anaphylaxis	Reaction to trace amounts of food, cutaneous contact or airborne particles – therefore likely clinical severity unknown
Co-existent asthma	Long distance from home to medical facilities
	Teenage patient
	Parental anxiety

key points

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The prevalence of peanut allergy is thought to be rising with 1 in 70 children affected in the UK. Accidental exposures are frequent and nut allergies are the leading cause of fatal food allergic reactions.

Allergic reactions to peanuts are nearly always an immediate, type 1-mediated hypersensitivity response. The typical physiological response associated with such a reaction includes smooth muscle contraction, mucous secretion and vasodilatation. These responses are typically rapid in onset and can lead to systemic effects i.e. anaphylaxis.

Peanut allergy most commonly presents in the first five years of life. More than 90% of nut allergic children will have a history of eczema, asthma, rhinitis or another food allergy. The clinical diagnosis of peanut allergy is made from a typical history in combination with clinical evidence of sensitisation i.e. the presence of peanut-specific IgE or positive skin prick tests. It is important to remember that the magnitude of the result does not reflect the severity of a future reaction. No test is helpful for screening e.g. in siblings of peanut-allergic children. The presence of Ara h 2 specific IgE suggests primary peanut allergy with the potential for more severe reactions.

Accidental exposure is commonplace with the greatest risk being in teenagers and young adults, where there is less adult supervision and an increase in risk-taking behaviour. There are several predictors of future severe reactions, including: poorly controlled asthma, multiple allergies and previous severe reactions. The amount of peanut consumed is likely to be the major determinant of severity.

Management consists of a comprehensive package of allergen avoidance advice, provision of emergency medication, family and school/nursery training. The mainstay of management is advice on allergen avoidance. Verbal and written advice should be given. Children and their carers should be educated in the recognition and treatment of allergic reactions and a written management plan should be provided.

Fast-acting antihistamines as well as adrenaline autoinjectors should be provided as appropriate. Undertreated asthma is a known risk factor for severe reactions and therefore patients with co-existent asthma should undergo regular review.

Novel therapies such as oral immunotherapy aimed at reducing reactivity to peanut and tree nut are emerging. Oral immunotherapy can successfully induce desensitisation in a large proportion of peanut-allergic children.

Table 3

Key MHRA recommendations on adrenaline autoinjector use for patients

- Always carry two adrenaline autoinjectors
- Inject yourself in the outer thigh (through clothes) at the first sign of a severe allergic reaction
- If you are in doubt as to whether your reaction is severe or not, use your adrenaline autoinjector

After using an adrenaline autoinjector, always:

- Call 999 and ask for an ambulance, stating 'anaphylaxis' (even if you feel better)
- Lie on your back with your legs raised
- Seek help and try to stay with someone until medical help arrives
- If you still feel unwell after the first injection, use your second autoinjector 5 to 15 minutes after the first
- Go to hospital after using your adrenaline autoinjector

- Check the expiry date of your adrenaline autoinjectors and ask your doctor or nurse to prescribe new ones *before* they expire
- Ensure you are trained on the specific brand of autoinjector you have been given

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PROGNOSIS

In studies, approximately 20% of peanut allergic children are thought to outgrow their peanut allergy.¹¹ In practice, however this number is much lower. Peanut allergy is rarely outgrown in older children and adults.¹²

'Illness, sleep deprivation and exercise can change the threshold at which an allergic patient will react'

Accidental exposure is commonplace with the greatest risk being in teenagers and young adults, where there is less adult supervision and an increase in risk-taking behaviour e.g. drinking alcohol.

While allergy testing cannot predict the magnitude of a reaction, there are several predictors of future severe reactions, including:

- Poorly controlled asthma
- Multiple allergies
- Previous severe reactions⁴

Patients are often told that their reactions will worsen with each subsequent accidental exposure – this is not true. The amount of peanut consumed is likely to be the major determinant of severity on each occasion. There are thought to be

several extrinsic factors that can change the threshold at which an allergic patient will react, including intercurrent illness, sleep deprivation and exercise.¹³

MANAGEMENT

Management consists of a comprehensive package of allergen avoidance advice, provision of emergency medication, family and school/nursery training. Because of the complexity and time involved, allergy specialists are best placed to provide this, but the process should begin in primary care before referral.

The mainstay of management is advice on allergen avoidance. Verbal and written advice should be given. Children and their carers should be educated in the recognition and treatment of allergic reactions and a written management plan should be provided.

'Undertreated asthma is a risk factor for severe reactions'

Fast-acting antihistamines as well as adrenaline autoinjectors should be provided as appropriate, see table 2, p22.¹⁴ Training on the use of adrenaline autoinjectors should be provided at diagnosis and retraining should occur at each follow-up appointment. The latest MHRA recommendations on adrenaline autoinjector use for patients are summarised in table 3, above. Undertreated asthma is a

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known risk factor for severe reactions and therefore patients with co-existent asthma should undergo regular review.

'Children and their carers should be educated in the recognition and treatment of allergic reactions'

Primary care

In addition to gathering evidence from a thorough clinical history to support the diagnosis, management of peanut allergy in primary care is five fold:

- Avoidance advice: Initial advice should be provided. Food labels should be checked for peanut in the ingredients and avoided if present. Food with product advisory labels (e.g. 'this may contain traces') should be avoided if high risk (e.g. snack food such as chocolate, cakes or biscuits)
- Antihistamine provision for mild reactions
- Adrenaline autoinjector provision if appropriate (see table 2, p22) and training
- Asthma review
- Allergy services referral

FUTURE THERAPIES

Novel therapies such as oral immunotherapy aimed at reducing reactivity to peanut and tree nut are emerging.

Peanut oral immunotherapy can successfully induce desensitisation in a large proportion of peanut allergic children.¹⁵ However, the procedure is time consuming, allergic reactions during treatment occur and further studies are required before this is widely available.

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Useful information

Anaphylaxis Campaign

Helpline: 0125 254 2029

www.anaphylaxis.org.uk

Allergy UK

Helpline: 0132 261 9898

www.allergyuk.org

British Society for Allergy & Clinical Immunology

www.bsaci.org

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