Food Allergy diagnosis, management & prevention

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Content

• Introduction
• Definitions
• Epidemiology
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• Common food allergens
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• Prevention
Definitions

- **Food Sensitisation** to a food refers to the presence of specific IgE antibodies to a food during skin or blood testing, however, *there is no clinical reactivity* or symptoms to ingestion of the food.

- **Food allergy** is an abnormal immune-mediated reaction to ingested food, **resulting in clinical symptoms**.

- NIAID expert panel, food allergy is defined “as an adverse health effect arising from a specific immune response that **occurs reproducibly on exposure to a given food**.”

- **Food intolerance** is a *non immune mediated* response to a certain food.


Prevalence of food allergy worldwide

• Prevalence of food allergy overall and of allergy to specific foods is uncertain because studies vary in methodological approaches.

• Based on recent extensive review of the literature, food allergy is estimated to affect more than 1% to 2% and less than 10% of the population.

• HealthNuts study in Australia and the EuroPrevall study in Europe - both used oral-food challenges as the gold standard in food-allergy prevalence determination estimate food allergy rates of 2–5% in adults and nearing 8% in children in Western countries.


Prevalence of food allergy in SA

- South African Food Sensitisation and Food Allergy (SAFFA) study showed food allergy to be 2.5% in 1-3yr old children in urban areas of Cape Town and 0.5% in children of the same age of Xhosa origin.
- Food allergy was found in 2,5% of young (1–3-year-old) urban South African children predominantly to egg and peanut) and in 0.5% of Black African subjects living in traditional rural environments.

Who is at risk of food allergy?

• High co-occurrence of food allergy with other atopic diseases, including atopic dermatitis, asthma, and allergic rhinitis.
• Children with moderate-to-severe atopic dermatitis appear to have approximately 35% risk of food allergy

Adverse Reactions to Foods

Source: Adapted from Boyce et al. JACI, 2010.
# Food allergy: clinical manifestations

<table>
<thead>
<tr>
<th>IgE</th>
<th>IgE/Non-IgE</th>
<th>Non-IgE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urticaria/angioedema</td>
<td>Atopic dermatitis</td>
<td>Protein-induced proctocolitis/enterocolitis</td>
</tr>
<tr>
<td>Rhinitis /Asthma</td>
<td></td>
<td></td>
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<tr>
<td>Anaphylaxis</td>
<td></td>
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</tr>
<tr>
<td>Oral allergic syndrome</td>
<td>Eosinophilic gastro-intestinal disorders</td>
<td>Celiac disease</td>
</tr>
<tr>
<td>Gastrointestinal symptoms (GIT)</td>
<td></td>
<td>Contact dermatitis</td>
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<tr>
<td></td>
<td></td>
<td>Herpetiform dermatitis</td>
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<tr>
<td></td>
<td></td>
<td>Heiner’s syndrome</td>
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</tbody>
</table>

Adapted from J Allergy Clin Immunol. 1999;103:717-728
IgE mediated food allergy

- Reaction from minutes to 2 hours
- **Skin symptoms** are commonly acute urticaria and angioedema. **Chronic urticaria is rarely a cause of food allergy.**
- **Gastro-intestinal symptoms:** vomiting, diarrhoea, abdominal cramps and itching of the lip
• **Respiratory manifestation** varies from mild symptoms such as rhinitis (e.g. sneezing, itchy, congested and runny nose) to severe symptoms such as laryngeal oedema, cough or wheeze.

• **Systemic anaphylaxis** is the most severe and life-threatening reaction involving multiple systems including cardiovascular collapse.
Non-IgE food reactions

- Reactions occur when the ingested food protein causes an immune response resulting in delayed
- Inflammation, normally in the skin or GIT.
- Symptoms usually occur 2-24 hours after ingestion of the food protein.
continued..

• **GIT symptoms:**
  ✓ irritability ‘Colic’
  ✓ vomiting ‘Reflux’ GORD
  ✓ food refusal or aversion
  ✓ diarrhoea like stools
  ✓ loose and/or more frequent
continued..

- **GIT symptoms:**
  - constipation – especially soft stools, with excessive straining
  - abdominal discomfort, painful flatus
  - blood and/or mucus in stools in an otherwise well infant
continued..

- **Skin symptoms:**
  - ✅ pruritus
  - ✅ erythema
  - ✅ non specific rashes
  - ✅ moderate persistent atopic dermatitis

- Treatment resistance e.g. to atopic dermas or reflux, increases likelihood of allergy
Foods responsible for intolerance or allergy

Eight major foods or food groups believed to account for 90 per cent of food allergies.

Milk
Wheat
Eggs
Soybeans
Peanuts
Tree Nuts (almond, cashew, pecan, walnut, hazelnut, macadamia)
Shellfish (shrimp, crab, lobster)
Fishes
Common food allergens

• Common food allergens in children include cow’s milk, egg, peanut, tree nut, wheat, soy, sesame, fish and shellfish.

• In adults, the most common food triggers are those of peanut, tree nuts, sesame seed and seafood.


<table>
<thead>
<tr>
<th>Cross reactive food allergens</th>
<th>Examples of foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peanut</td>
<td>Other legumes (peas, lentils, beans, soya), treenuts, sesame seeds</td>
</tr>
<tr>
<td>Tree nuts</td>
<td>Other tree nuts</td>
</tr>
<tr>
<td>Fish</td>
<td>Other fish</td>
</tr>
<tr>
<td>Shellfish</td>
<td>Other shellfish</td>
</tr>
<tr>
<td>Cow’s milk</td>
<td>Beef, goat’s milk, mare's milk</td>
</tr>
<tr>
<td>Pollen</td>
<td>Some uncooked fruits and vegetable, some tree nuts or peanut</td>
</tr>
<tr>
<td>Latex (latex gloves)</td>
<td>Kiwi, avocado, banana, papaya, potato, green pepper, chestnut</td>
</tr>
</tbody>
</table>
Fish allergy

• Prevalence is higher in fish eating countries

• Cross reactivity with other fish is high

• Heat resistant
Fish allergy mimics

• **Scombroid fish poisoning** occurs from the ingestion of spoiled fish. Symptoms include flushing, urticaria, vomiting and diarrhoea.

• **Anisakis** - humans become the accidental host by eating raw or undercooked fish. Symptoms: urticaria, angioedema and anaphylaxis.
Hen’s egg allergy - egg white

- Egg white common in food allergy
- Egg white has more allergens than yolk
- Ovomucoid is the protein and major allergen in egg white
- Cross-reactivity with other birds' eggs, like duck
- Egg allergy has a close association with atopic eczema, and increased aeroallergen sensitisation and asthma
Hen’s egg allergy-egg white

• Clinical relevance:

✓ patients allergic to heat labile allergens will tolerate baked egg e.g. cake, but react to cooked egg or fresh egg e.g. mayo

✓ Ovomucoid is heat stable and reactions are to egg white in any form e.g. any food with egg ingredient

✓ Few studies suggest regular ingestion of baked products might assist with outgrowing the egg or cow's milk allergy.


Peanut allergy

- Children are increasingly exposed at a young age
- Responsible for the majority of food induced anaphylaxis cases
- Multiple allergens described
- Ara h 2 common component to test for true peanut allergy
- Association with other legumes (chick peas, lentils, beans, soya)
Peanut allergy

- Thirty per cent or more of peanut-allergic children will also be allergic to tree nuts, and 25% allergic to sesame
- Peanut allergy is outgrown in approximately 25% of children
- Peanut allergy is associated with a decrease in quality of life
Cow’s milk allergy

• One of the most common food allergies in the first years of life
• Proteins: Caseins 80% whey 20%
• Major whey proteins being β-lactoglobulin and α-lactalbumin
• High degree of cross-reactivity between cow, goat’s milk, others sheep and mare.
Cow’s milk allergy

• Clinical relevance:
  ✓ Patients with whey allergy tolerate extensively heated milk e.g. UHT milk and NOT fresh milk
  ✓ Casein allergic patients react to milk in any form.
Beef milk syndrome

- Between 10% and 20% of children allergic to cow milk are also allergic to beef.
- 93% of children allergic to beef are also allergic to milk.
- The molecular basis for this syndrome is allergy to bovine serum albumin.
Case report

• A 63yr old man in SA with psoriasis residing adjacent to cattle farm. No previous food allergy. Had dinner 1yr ago and experienced urticarial rash 3hrs later, no clear trigger. Similar symptoms occurred repeatedly, always about 3hrs after eating out. On a different occasion, had steak and chips, experienced diffuse urticaria and tightening of throat 3hrs after eating, was hospitalised and given IV antihistamines (ps: imi adrenalin is preferable)

• sIgE Beef 1,26kU/L, Mutton 0.34kU/L, alpha-gal 29,6kU/L.

CL Gray, A van Zyl, L Strauss. ‘Midnight anaphylaxis’ to red meat in patients with alpha-gal sensitisation: a recent discovery in the food allergy world and a case report from South Africa. CACI. 2016; 29(2):102-104
Alpha-gal and red meat reactions

• Most common reported and observed symptom was pruritus, symptoms can progress to be severe or even life threatening.

• Many patients do not report any symptoms prior to the onset of a reaction and, equally, symptoms do not occur with every exposure to red meat.

• Reactions are delayed and may be due to eating meat 3–5 h earlier.

• Patients largely reported reactions confined to episodes of consuming fatty portions of red meat.

ADVERSE REACTIONS TO MAMMALIAN MEATS AND CORRELATION WITH ALPHA-GAL SENSITISATION IN RURAL EASTERN CAPE, SOUTH AFRICA

Tshegofatso Mabelane, Maresa Botha, Heidi Facey-Thomas, Michael Levin
Food associated- exercise induced anaphylaxis

• *FAEIA* occurs when anaphylaxis is triggered by exercise after ingestion of the responsible allergenic food (e.g. wheat, seafood). The patient tolerates the food but experiences anaphylaxis with associated exercise within a few hours of ingesting that food.
NSAIDS associated food allergy

• NSAIDs have been shown to enhance food allergy
• Case report: 59 yr old man recurrent reactions to ingesting wheat, for 1yr. Frequently experienced urticaria but sometimes anaphylaxis including wheeze, angioedema, loss of consciousness. SPT + for wheat but OFC negative.

Shirai T. 2003
Oral Allergy Syndrome

• *Oral allergy syndrome (OAS)* is also known as pollen food allergy syndrome and is a local allergic reaction usually to raw fruits and vegetables. OAS is characterised by local symptoms which include itch or tingling of the lips, tongue and roof of the mouth and throat with or without swelling. Systemic symptoms are rare.
Natural course of common food allergen

- Most children with food allergy eventually tolerate milk, egg, wheat, and soy.

- Recent research suggests that about 79% of children allergic to milk or egg will resolve by 16 yrs of age. However, natural tolerance is seen quicker with 65% wheat resolution by 12yrs and 69% soy by 10yrs.

- Peanut, tree nut, fish and shellfish allergy persist for longer with lower resolution. Lower number of children develop natural tolerance and studies suggest only 20% resolution of peanut allergy, 10% of tree nut allergy.

History taking

• What food do you suspect caused the reaction?
• How much of the suspected food did you eat?
• What other foods were eaten at the time of reaction?
• Do you know all the ingredients in the food product?
• How was the food prepared and served?
History taking

• What was the time lapse between eating the food and the reaction?
• Do similar symptoms occur on other occasions when the food is eaten?
• Is there a history of avoiding or refusing to eat the suspected food?
• How is the feeding development in a child? E.g. refusal of all food groups or food for a long period of time without reacceptance of the food.
Diagnosis

• IgE mediated food allergy is diagnosed through a detailed medical history in conjunction with skin testing or

• serum specific IgE testing performed by specialists qualified in interpreting the results. **Test 4-6 weeks after reaction.**

• Oral food challenge is the gold standard for diagnosis especially if history is unclear. *Only done by allergy specialist or experienced doctor in allergy and resusc skills.*
Skin prick test

<table>
<thead>
<tr>
<th></th>
<th>Age &lt;2yrs</th>
<th>Wheal measurement</th>
<th>Age &gt;2yrs</th>
<th>Wheal measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>6mm</td>
<td>Milk</td>
<td>8mm</td>
<td></td>
</tr>
<tr>
<td>Egg white</td>
<td>5mm</td>
<td>Egg white</td>
<td>7mm</td>
<td></td>
</tr>
<tr>
<td>Peanut</td>
<td>4mm</td>
<td>Peanut</td>
<td>8mm</td>
<td></td>
</tr>
</tbody>
</table>

95% PPV): Sporik 2000
❖ NO ROLE OF TOTAL IgE or Mixed allergens e.g. FXS!!!!
Investigation in anaphylaxis
Non IgE food reactions diagnosis

- Diagnostic tests are usually negative (SPT/specific IgE)
- About 50% of infants with Non-IgE allergic reactions to cow’s milk are complex and need to be assessed by an allergist.
- Associated allergy to soya in 50-60% of these infants.
- Adverse reactions to soy have been reported in 10–35% of infants with CMPA, regardless of positive or negative specific IgE antibodies for CMP.

Medical Management: IgE reactions

- mild to moderate reactions includes symptoms of the skin (erythema, urticaria, angioedema), nasal (itchy/runny nose, sneezing, itchy/watery eyes), oral (itchy mouth) or abdominal (nausea, vomiting, abdominal cramps, diarrhoea). Treatment is with H1-blocker antihistamines (preferably in liquid form for quick absorption) e.g. allergex, benadryn, cetirizine, etc.
First line management

✓ Removal of the trigger allergen
✓ ABC of resusc
✓ Administration of neat adrenalin 1:1000 at 0.01ml/kg body, maximum of 0.5ml intramuscularly on the mid-outer thigh.
✓ Repeat adrenalin administration in 5 minutes if no response.
Second line management

✓ Call for help
✓ Position the patient in a recumbent position
✓ Give oxygen by face mask
✓ Nebulise patients with bronchospasm or asthmatics: Use 1 mL salbutamol respirator solution in 3 mL sodium chloride 0.9% every 20 minutes or continuous. Ipratropium bromide 0.5 mg can be added to salbutamol.
Anaphylaxis without shock

✓ Administer oral antihistamine e.g. allergex 0.2mg/kg
✓ Observe and repeat adrenalin after 5 minutes if no improvement
✓ Oral corticosteroid e.g. prednisone 2mg/kg
Anaphylaxis with shock

✓ Administer IV crystalloid preferably or colloid at 20ml/kg as a bolus in the first five minutes. Repeat if necessary until blood pressure improves.

✓ Repeat 2nd dose adrenalin after 5 minutes

✓ Initiate inotropic support if more fluid is needed (dopamine, adrenalin infusion).

✓ Call ICU
Continued..

✓ Administer corticosteroids IVI e.g. hydrocortisone 4mg/kg
✓ Antihistamine IVI e.g. promethazine 1mg/kg
✓ Glucagon (0.025–0.1 mg/kg up to 1 mg intravenously every 20 minutes) is administered in patients that are failing to respond to adrenalin, especially those on beta-blockers.
Critical facts

• Adrenalin is safe to administer and there is no absolute contraindication.
• Patients may experience transient pallor, palpitations and headache
• Corticosteroid is used to prevent biphasic reaction and do not prevent cardiorespiratory arrest or death.
Epipen
Adrenalin/ Epipen absolute indications

- Previous severe food-induced allergic reaction;
- Asthma or significant respiratory disease and food allergy;
- Exercise-induced food-dependent anaphylaxis;
- Idiopathic anaphylaxis;
- Underlying mast-cell disorder with any previous reaction.
Adrenalin/ Epipen relative indications

- Nut allergy (ie peanut or tree nut);
- Recurrent wheeze in young children with food allergy;
- Previous allergic reactions to trace allergen exposure or contact;
- Increasing age – death from anaphylaxis is rare under the age of five years, whereas adolescents and young adults are at particular risk;
Adrenalin/ Epipen relative indications

• Limited access to emergency medical care;
• Travel to remote or unfamiliar regions where access to medical care may be difficult, language differences may exist, or when the allergen is commonly found in local cuisine (e.g. peanut in Chinese or Indian cuisine);
• Multiple-food allergies or those food allergies that are infrequently outgrown (e.g. peanut, tree nut, sesame, finfish and shellfish);
• Older children (second decade) and adults who remain allergic to egg and milk are at increased risk of more severe reactions.
Non-IgE CMPA management

• elimination diet for 2-4 weeks + trial 6-8 wks specialised formula
  ✓ EHF
  ✓ AAF especially in severe Non-IgE reaction (gastro-enterocolitis with faltering growth, severe atopic dermatitis, symptoms during exclusive breastfeeding)
  ✓ Replacement of Ca & Vit D in infants or breastfeeding mother on strict avoidance

• Refer to allergist for diagnosis
  ❑ Partially hydrolysed formulae should not be used in CMPA
<table>
<thead>
<tr>
<th>Example formula</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensively hydrolysed</td>
<td></td>
</tr>
<tr>
<td>Nan Alfare</td>
<td>Whey</td>
</tr>
<tr>
<td>Similac Alimentum</td>
<td>Casein</td>
</tr>
<tr>
<td>Nutricia Pepticate</td>
<td>Whey</td>
</tr>
<tr>
<td>Novolac Allernova Smooth</td>
<td>Casein</td>
</tr>
<tr>
<td>Amino acid</td>
<td></td>
</tr>
<tr>
<td>Nutricia Neocate</td>
<td>Free amino acid</td>
</tr>
<tr>
<td>Neomino</td>
<td>Free amino acid</td>
</tr>
<tr>
<td>Aminova</td>
<td>Free amino acid</td>
</tr>
<tr>
<td>Aminomed</td>
<td>Free amino acid</td>
</tr>
</tbody>
</table>

- EHF contains 85% amino acids and some cow’s milk protein. It is tolerated by 90% of infants with cow’s milk allergy.
- AAF contains 100% amino acids.
Cow’s milk allergy management

When is specialised infant formula recommended for food allergy?

• infants with confirmed cow’s milk allergy and soy allergy when breastfeeding is not possible or supplementary feeding is required.

• allergic symptoms in the breastfed infant persist after trial of maternal dietary exclusion of cow’s milk protein (dairy) and soy protein.
Non medical management

- Regular monitoring of growth and nutritional status.
- Highly restricted diets affect nutritional status resulting in failure to thrive.
- Unnecessary food avoidance and inappropriate diets in young children enhance feeding disorders.
- Nutrient supplementation and dietician supervision are mandatory in children with food allergy.
Non medical management

• Food labelling

Some statements on labels are unregulated and included at the discretion of the food manufacturer e.g. ‘May contain traces of nuts’. Patients highly sensitive to these allergens should rather avoid exposure.
Non medical management

• Patient education includes:

✓ Early recognition of an allergic reaction by patient, family members, friends, teachers in schools and colleagues at work.

✓ Telling and declaring food allergy

✓ Not eating a food that they are unsure of

✓ To not share or swap food and utensils (unless washed).

✓ Risk minimisation strategies (e.g. hand washing before and after eating to prevent cross contamination).
**ANAPHYLAXIS ACTION PLAN**

**Name:** [Name]
**Address:** [Address]
**City:** [City]
**Telephone:** [Telephone]
**Mobile Phone:** [Mobile Phone]
**Email:** [Email]

**EMERGENCY CONTACT:**
- **Relative to Patient:** [Relative]
- **Telephone:** [Telephone]

**MEDICAL NUMBER:** [Number]

**WILD REACTION**
- **SYMPTOMS:** [Symptoms]
- **ACTION:** [Action]

**SEVERE REACTION: any one of**
- **SYMPTOMS:** [Symptoms]
- **ACTION:** [Action]

**GIVE ANTIHISTAMINE**
- **DOSE:** [Dose]
- **ACTION:** [Action]

**GIVE EPINEPHRINE IMMEDIATELY (PEO for instructions)**
- **ACTION:** [Action]

**NOTE:**
- This plan has been recommended to you by a medical practitioner. See your medical practitioner for further guidance on this action plan.

**DATE:** [Date]
**SIGNATURE:** [Signature]
Psychosocial impact of food allergy

- Bullying
- Anxiety and fear of eating outside home environment and therefore not eating or missing special events.
- Depression
- Social isolation
- Maladaptive coping responses that interfere with the psychological and social development and optimal functioning of family
Prevention strategies

• German Infant Nutritional Intervention (GINI) study, compared the preventive effect of three hydrolysed formulae versus a standard cow’s milk formula as breast-milk substitutes in high-risk infants. A 10-year and 15-year follow-up of the GINI cohort continued to show a reduced cumulative risk of AD, particularly with extensively hydrolysed casein formula.

• No evidence for soya-based formulae in allergy protection in comparison to cow’s milk-based formulae.

• No formula milk has been found to be more beneficial than breastfeeding as an allergy-prevention strategy.
Prevention strategies

• The *Learning Early About Peanut Allergy* study, the first randomised controlled trial to study the introduction or avoidance of dietary peanut in infants aged between 4 and 11 months, found that infants who consumed peanut between 4 and 11 months of age were significantly less likely to have developed peanut allergy by age 5 years than those infants who avoided peanut until age 5 years.

✓ 86.1% relative reduction

QUESTIONS