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# Food allergy and intolerance

This article forms part of a series looking at the relationship between diet and good health, and the role of the dietitian in the primary health care team. This article discusses adverse reactions to food including IgE mediated food allergy and nonimmunological food reactions. Coeliac disease, a T-cell mediated reaction to gluten, will be discussed in the next article in this series.

■ **Adverse food reactions can be caused by both immunological and nonimmunological mechanisms. The most common immunological reactions are IgE mediated responses to foods such as egg, milk, peanut, tree nuts, sesame, wheat, soy, fish and seafood. Nonimmunological adverse food reactions encompass metabolic, toxic, psychological and pharmacological reactions. Pharmacological reactions are estimated to affect up to 20% of the population and are caused by food additives and naturally occurring food chemicals.**

## Food allergy

Food allergy is defined by the Australian Society of Clinical Immunology and Allergy as an 'IgE mediated food hypersensitivity'.<sup>1</sup> Food allergy occurs in atopic individuals who produce IgE antibodies to food proteins. The foods most commonly involved are egg, milk, peanut, tree nuts, sesame, fish, seafood, wheat and soy. Reactions usually occur immediately after food ingestion<sup>2,3</sup> and may manifest as an acute rash around the mouth with redness and swelling of the face. More severe reactions progress to urticaria, angioedema, breathing difficulty, vomiting, and/or anaphylactic shock, sometimes resulting in death.<sup>4,5</sup> Food allergy may also manifest as chronic eczema where the relationship with food is not always obvious (*Table 1*).

Food proteins can also be responsible for non-IgE mediated food hypersensitivity syndromes. These include food protein induced enterocolitis, benign eosinophilic colitis, allergic eosinophilic gastroenteritis and coeliac disease. Other than coeliac disease, the mechanisms by which these syndromes occur are unknown. The same foods that cause food allergy, as well as many other foods, can also be responsible for non-IgE mediated food hypersensitivity syndromes. The symptoms are gastrointestinal and generally delayed, developing several hours to days after ingestion of the offending food.

## Prevalence and natural history

Prevalence of food allergy varies with age and is most common in infants and young children. Approximately 6% of children in the 0–5 years age group have a food allergy compared with 1–2% of adults.<sup>5</sup> The clinical onset is usually in the first year of life, often with the first introduction of a food, and is strongly associated with atopic eczema. Multiple foods are frequently involved in children but, from around 5 years, allergy to only one or two foods is the norm.<sup>3</sup>

Most children outgrow milk, egg, soy and wheat allergies before they reach school age. Peanut, tree nuts, fish and seafood allergies often persist into adulthood<sup>2,6</sup> and only 20% of peanut allergic children tolerate peanut protein as adults.<sup>7</sup>

## Diagnosis

Diagnosis of a food allergy entails:

- detailed clinical history of symptoms and reactions to food(s)
- results of skin prick tests (SPT), and/or
- RAST to identify the presence of allergen specific IgE antibodies.<sup>8,9</sup>

Reliable tests for the diagnosis of non-IgE mediated hypersensitivity syndromes other than coeliac disease or dermatitis herpetiformis are lacking. Confirmation of both IgE and non-IgE mediated food hypersensitivity requires resolution of symptoms after elimination of the suspected food.

## Dietary management

Currently the management of food allergy involves complete avoidance of the food proteins identified. Since 2002, mandatory food labelling of the most common food allergens in Australia and New Zealand has assisted consumers with allergies. In 2003, Food Standards Australia and New Zealand (FSANZ) conducted a quantitative consumer survey on 513 Australian and New Zealand consumers with food allergy.<sup>10</sup> The survey showed that 42% of participants had experienced a severe allergic reaction after their food allergy was identified. The most common reason was accidental consumption (36%), which suggests that more than one-third of the consumers surveyed were not aware of all sources of the allergen. Only 36% of participants had consulted a dietitian for advice regarding allergen avoidance. Accredited Practising Dietitians (APDs) with experience in food allergy can advise patients on sources of food allergens, possible sources of contamination,

and suitable substitute foods so that nutritional adequacy is not compromised. An APD also takes into consideration life stage and social circumstances, tailoring dietary advice accordingly.

### Food intolerance

Food intolerance is defined here as an adverse reaction to a food chemical for which no immunological mechanism has

been demonstrated or suspected. Food intolerance can affect any system of the body. The most common symptoms include: irritable bowel,<sup>11,12</sup> headaches, migraines, fatigue, behavioural problems,<sup>13–17</sup> or urticaria<sup>18</sup> (*Table 1*). Asthma symptoms can also be triggered in some patients<sup>19</sup> and, occasionally, anaphylactoid reactions occur.<sup>20</sup> Reactions are dose dependent and tend to be delayed (hours to days), making it difficult to identify the cause.

Table 1. Adverse food reactions

	Food allergy	Coeliac disease	Food intolerance
<b>Presentation</b>	<ul style="list-style-type: none"> <li>• Infantile eczema (particularly facial)</li> <li>• Acute reactions               <ul style="list-style-type: none"> <li>– rash around mouth</li> <li>– urticaria</li> <li>– angioedema</li> <li>– vomiting</li> <li>– breathing difficulty</li> <li>– anaphylaxis</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Fatigue</li> <li>• Gastrointestinal symptoms               <ul style="list-style-type: none"> <li>– bloating</li> <li>– cramps</li> <li>– diarrhoea</li> <li>– constipation</li> </ul> </li> <li>• Anaemia</li> <li>• Osteoporosis</li> </ul> <p>NB: May have no symptoms</p>	<ul style="list-style-type: none"> <li>• Episodic/recurrent/chronic               <ul style="list-style-type: none"> <li>– hives/swellings</li> <li>– stomach/bowel irritation</li> <li>– headaches/migraine</li> <li>– fatigue/aches/pains</li> <li>– mouth ulcers</li> <li>– sinus congestion/polyps</li> </ul> </li> <li>• In children:               <ul style="list-style-type: none"> <li>– irritable behaviour ('colic', 'screaming', disturbed sleep, leg aches and pains, ADHD)</li> <li>– reflux (from birth)</li> <li>– eczema/itchy rashes</li> <li>– nappy rash</li> </ul> </li> </ul>
<b>Age of onset</b>	Infants and toddlers (mostly)	Any age	Any age
<b>Family history</b>	<ul style="list-style-type: none"> <li>• Atopic               <ul style="list-style-type: none"> <li>– asthma</li> <li>– eczema</li> <li>– hay fever</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• HLA gene association               <ul style="list-style-type: none"> <li>– coeliac disease</li> <li>– type 1 diabetes</li> <li>– thyroid disease</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Commonly               <ul style="list-style-type: none"> <li>– irritable bowel</li> <li>– hives</li> <li>– headaches</li> <li>– mouth ulcers</li> </ul> </li> </ul>
<b>Reaction timing</b>	Immediate (minutes → 1–2 hours)	Hours → days	Hours → days
<b>Reaction reproducibility</b>	Reproducible	Reproducible	Variable
<b>Mechanism</b>	Immune (IgE antibodies)	Immune (inflammatory T-cells)	Nonimmune (irritation of nerve endings)
<b>Food triggers</b>	Specific food proteins: egg, milk, peanut, tree nuts, sesame, fish, crustaceans, wheat, soy	Gluten (wheat, triticale, rye, barley)	<ul style="list-style-type: none"> <li>• Natural food chemicals: salicylates, amines, monosodium glutamate (MSG)</li> <li>• Food additives: preservatives and artificial food colours</li> <li>• Some cereals</li> <li>• Dairy products</li> </ul>
<b>Tests</b>	<ul style="list-style-type: none"> <li>• Skin prick tests</li> <li>• Blood tests (RAST) – measure IgE to specific allergens</li> </ul>	<ul style="list-style-type: none"> <li>• Antibodies to tissue transglutaminase (must be eating gluten at time of testing)</li> <li>• Small bowel biopsy</li> </ul>	<ul style="list-style-type: none"> <li>• Elimination diet</li> <li>• Food chemical challenges</li> </ul>
<b>Dietary management</b>	Complete avoidance of identified food proteins	Gluten free diet (strict)	Comprehensive dietary modification: maintain overall chemical intake below reaction threshold
<b>Outcome</b>	<ul style="list-style-type: none"> <li>• Egg, milk, wheat and soy (usually outgrown)</li> <li>• Peanut, tree nuts, seafood (often persists)</li> </ul>	<ul style="list-style-type: none"> <li>• Life long immune reactivity</li> <li>• Bowel pathology and antibodies usually return to normal on gluten free diet</li> </ul>	<ul style="list-style-type: none"> <li>• Life long susceptibility</li> <li>• Variable tolerance</li> <li>• Symptoms can come and go</li> </ul>

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Withdrawal, supersensitivity, tachyphylaxis and tolerance are often observed.<sup>21</sup> Food chemicals implicated include artificial food colours, preservatives, flavour enhancers, glutamates, vasoactive amines and salicylates.<sup>21–25</sup> It is common for patients with food intolerance to react to several chemicals – all of which can be found in a wide range of foods. A family history of symptoms and specific chemical intolerances is common.<sup>21</sup>

## Prevalence

Prevalence is difficult to estimate as the mechanism of food intolerance is yet to be identified and there is still scepticism about its existence. Epidemiological studies of prevalence based on interview or questionnaire have included both food allergic and food intolerant individuals, often without differentiation. However, estimates of between 5–20% have been cited by respected medical practitioners with extensive experience of patients suffering from food intolerance.<sup>26,27</sup>

## Diagnosis

There are currently no reliable clinical tests for the diagnosis of food intolerance.<sup>28</sup> Symptoms, chemical triggers and tolerance levels are idiosyncratic so each patient must be investigated and assessed individually.

The diagnostic process involves elimination of the suspect food or chemical from the diet, with resolution of symptoms, and a recurrence of symptoms on reintroduction.

Patients are commenced on a diet low in naturally occurring salicylates, amines and glutamates and free of added flavour enhancers, preservatives and artificial colours. Improvement of symptoms on this diet suggests that food chemicals may be responsible. The diagnosis is confirmed if symptoms recur on sequential reintroduction of the food chemicals either in whole food or, ideally, as double blind, placebo controlled, encapsulated challenges with the purified food chemicals.

## Dietary management

An APD experienced in the area of food chemical intolerance can advise and supervise patients through all stages of the low chemical diet, challenges and determination of dose thresholds to the chemicals that cause symptoms. An APD can provide the patient with appropriate advice to encourage optimal nutrition both during the investigation and after diagnosis.

## Resources

- To find an APD, visit the 'Find an APD' section of the Dietitians Association of Australia website at [www.daa.asn.au](http://www.daa.asn.au) or telephone 1800 812 942
- Anaphylaxis Australia – a nonprofit organisation that provides information, training and emotional support for allergy sufferers and their families: [www.allergyfacts.org.au](http://www.allergyfacts.org.au)
- Australasian Society of Clinical Immunology and Allergy (ASCI): [www.allergy.org.au](http://www.allergy.org.au).

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