

# Asthma

& Allergy

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An information paper for health professionals



FOR HEALTH PROFESSIONALS

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## Contents

- 2 [Think asthma, think allergy](#)
- 3 [Asthma and allergy facts](#)
- 3 [Atopy as a marker for asthma](#)
- 4 [Allergen triggers of asthma](#)
- 4 [Non-allergen triggers of asthma](#)
- 4 [Work-related asthma](#)
- 5 [Allergy patterns](#)
- 5 [Diagnosis](#)
- 6 [Allergy tests](#)
- 8 [When should you refer to a specialist?](#)
- 8 [Medical management](#)
- 8 [Allergy avoidance](#)
- 12 [Specific allergen immunotherapy \(desensitisation\)](#)
- 13 [Preventing development of asthma](#)
- 16 [Resources and further information](#)

## Think asthma, think allergy

Allergic conditions are very common in Australia. Around 1 in 3 people will develop allergies some time during their life. One of the misconceptions about allergic conditions is that they are trivial – however, the opposite is true. Allergic conditions have a significant impact on the person’s quality of life and are associated with other medical conditions. Asthma is one of the most common allergic conditions, affecting 1 in 10 children and adults.<sup>1</sup>

In asthma, allergic inflammation is the major underlying abnormality affecting the airways.<sup>2</sup> This inflammation leads to bronchial hyper-responsiveness to triggers, including infections, allergens and non-specific irritants.

A comprehensive approach to asthma management includes:

- appropriate medication and delivery systems
- identification of relevant allergen triggers
- allergen avoidance measures where appropriate and possible
- specific allergen immunotherapy (SIT) where indicated
- self-management education (including a written asthma action plan)
- regular review.

## Asthma and allergy facts

Asthma remains a significant health problem in Australia, with prevalence rates that are high by international comparison. The prevalence of asthma in Australia is about 1 in 10, equivalent to about 2 million people.<sup>3</sup>

There is also a strong link between asthma and allergy:

- around 30–40 per cent of Australians have allergic disease<sup>4</sup>
- more than 80 per cent of people with asthma have evidence of allergic sensitisation<sup>5</sup>
- early childhood asthma is associated with sensitisation to environmental allergens in many cases
- the level of early childhood exposure to indoor allergens correlates with allergic sensitisation<sup>6,7</sup>
- sensitisation to a greater number of allergens is associated with an increased prevalence of asthma.<sup>8</sup> However, sensitisations do not cause asthma, instead people with asthma have an increased risk of developing sensitisations.

## Atopy as a marker for asthma

Atopy is defined as a personal and/or familial tendency to develop hypersensitivity to environmental allergens, usually in childhood or adolescence. A person may become sensitised to an allergen and produce IgE antibodies (initiates an allergic response) when exposed to that particular allergen (usually proteins). As a consequence, individuals can develop typical symptoms of asthma, rhinitis/conjunctivitis or atopic eczema/dermatitis.<sup>9,10</sup>

There are many different conditions that cause wheezing in childhood. Most resolve by 6 years of age, and are due to small airways rather than asthma. This type of 'early transient wheezing' is associated with abnormal lung function in infancy and maternal smoking, but not maternal asthma or atopy. Small airway calibre is thought to predispose to virus-induced wheezing in infancy, which resolves in later childhood because airways increase in size.

### Atopy is strongly associated with asthma that persists beyond the first 6 years of life.

- allergic sensitisation to food allergens in the first 2 years of life is associated with asthma at 7 years of age
- sensitisation to inhalant allergens at 7 years has shown a similar association in those at 22 years<sup>11,12</sup>
- the presence of other allergic disorders such as eczema or allergic rhinitis, and a parental history of atopy, are risk factors for persistent asthma at 6 years.<sup>13</sup> Atopy is also a risk factor for hospitalisation in asthma, as are parental smoking, frequent respiratory symptoms, airway hyper-responsiveness and reduced lung function.<sup>14</sup>

### The Allergic March

Allergic disorders typically follow a characteristic sequence that is described as the Allergic (or Atopic) March.<sup>15-19</sup> Atopic eczema and food allergies tend to commence in infancy or early childhood, which are often followed by the development of asthma and allergic rhinitis in the preschool years. In teenage years, symptoms of perennial rhinitis may persist and increase, and hay fever (seasonal allergic rhinitis and conjunctivitis) may develop for the first time.

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**It should be noted that the absence of associated atopy or other allergic disorders does NOT preclude a diagnosis of asthma, particularly in early childhood.**

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## Allergen triggers of asthma

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Allergens are usually small proteins or glycoproteins that provoke an immune response in allergic people. They include house dust mites, animal dander and saliva, pollen and moulds. Foods are rarely a trigger for asthma.

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In individuals with asthma, it is well established that exposure to relevant allergens may trigger an asthma attack and/or worsen asthma symptoms.

Evidence of this exists for indoor allergens such as house dust mites, pets and cockroaches, as well as outdoor allergens such as pollen and moulds.<sup>20-29</sup>

However, there is not necessarily a direct relationship between allergen exposure and symptoms in some individuals as:

- patients are often sensitised and exposed to a number of allergens
- there are other triggers such as viral infection, passive smoke exposure and medication
- the magnitude of response to the same level of allergen exposure can vary considerably between individuals
- intrinsic airway factors unrelated to allergens may contribute to the level of symptoms
- there can be a late phase response, that is, reactions evolve over hours.

Unlike most other asthma triggers, exposure to some allergen triggers can be reduced or avoided. This can lead to improved control of asthma and a reduced need for medication.

## Non-allergic triggers of asthma

Non-allergic triggers of asthma include:

- respiratory tract infections, particularly viral
- bacterial infections, such as sinusitis and bronchitis
- physical factors, such as exercise, cold air, changes in temperature and oesophageal reflux
- irritants such as cigarette smoke, irritant smells (e.g. paint, cleaning agents, perfumes) and air pollution (e.g. high levels of car exhaust fumes or fumes from unflued gas heaters)
- medicines such as aspirin, non-steroidal anti-inflammatory agents, beta blockers
- food/beverage additives and/or preservatives
- emotional or stress-related factors.

## Work-related asthma

Work-related asthma includes both worsening of asthma control (work-exacerbated asthma) and new-onset asthma (occupational asthma) due to the workplace environment. Work-related asthma is often induced by sensitisers or irritants.

Examples include:

- flour and grain dust
- latex
- animal allergen (e.g. urine, dander).

Over 300 causes of work-related asthma have been described and the majority of these are due to allergens rather than irritants.<sup>30</sup>



## Allergy Patterns

There are two main types of allergy patterns:

- Seasonal – most often caused by outdoor allergens such as pollens or moulds
- Perennial – most frequently, although not necessarily, caused by indoor allergens such as house dust mites, moulds, cockroaches and animal dander.

However, even in allergic asthma, most acute asthma exacerbations are triggered by viral infections.

## Diagnosis

### History taking

As well as general questions about asthma symptoms, it is important to consider the following:

#### 1. Are allergens triggering asthma symptoms?

Timing of symptoms

- season – for example, pollen allergy can worsen asthma symptoms in the summer months, while winter symptoms may indicate underlying house dust mite allergy or airway inflammation related to virus-associated exacerbations
- time of week – for example, if symptoms mostly present during the weekends, consider the person's activities, such as horse riding or household tasks such as cleaning.

Work environment

- do symptoms improve away from the workplace?
- what potential allergen exposures are occurring at work?

Geographic associations of symptoms

- are symptoms more prominent at work, home, during holidays or any other location?

Environmental descriptors

- ask about conditions at home, such as house age, construction, ventilation, dampness, floor coverings, room clutter, bedding, and other soft furnishings/window coverings
- check if there are soft toys in the bedroom
- check if there are pets in the home, particularly whether pets have access to the bedroom of the person with asthma
- ask whether there is history of smoking in the family.

#### 2. Is allergic rhinitis present?

Rhinitis of any cause (including allergic rhinitis) is a risk factor for asthma,<sup>31,32</sup> and the presence of allergic rhinitis is associated with poorer asthma control in children and adults.<sup>33,34</sup> All patients with asthma should be examined for the presence of allergic rhinitis, and be checked for:

- the presence of allergic “shiners”
- the nasal crease
- mouth breathing
- nasal airflow – this can be examined by placing a metal object under the nasal passages and looking at the “condensation” pattern as the patient breathes through the nose
- nasal turbinate swelling – nasal turbinates can be examined using an otoscope that is placed just inside the nostrils; in allergic rhinitis the turbinates are pale and oedematous.

For more information, see *Managing allergic rhinitis in people with asthma* an information paper for Health Professionals via the National Asthma Council Australia website: [nationalasthma.org.au](http://nationalasthma.org.au).

## Allergy tests

Allergy testing should be considered in patients with asthma who need preventer therapy. It should also be considered in patients who have asthma and other allergic diseases.

Allergy testing is important in asthma management, and when considered together with the history, it helps to identify environmental triggers for asthma and allows appropriate avoidance advice to be given.

Allergy testing:

- detects the presence of specific IgE antibodies to selected allergens
- identifies which allergens the patient is sensitised to (Note: Sensitisation does not necessarily indicate that this allergen is clinically relevant to the patient as there needs to be the history of symptoms worsening on exposure as well)
- may be done in vivo by skin prick testing or in vitro using serum specific IgE tests
- results must be considered together with patient history and in some cases results of specific challenge tests to be clinically relevant
- is rebatable via Medicare (both skin prick testing and serum specific IgE)
- must be performed by a trained and experienced medical professional. Appropriate facilities to treat systemic allergic reactions (anaphylaxis) should also be available.<sup>35</sup>

For advice on allergies in a person with severe or unstable asthma, or children under 2 years, refer to a specialist allergist for investigation.<sup>36,37</sup>

### Skin prick tests

The Australasian Society of Clinical Immunology (ASCIA) recommends skin prick testing as the first-choice method for investigating allergies in a person with asthma.<sup>36,37</sup>

Skin prick testing is particularly useful in people with moderate to severe asthma, but is suitable for anyone who has more than mild intermittent asthma. There are no age limitations, although the very young and the elderly may have diminished wheal sizes compared to others with asthma.<sup>36</sup>

Skin prick testing is only useful if there is appropriate allergen selection. Selection is made based upon patient history, knowledge of local aerobiology and the patient's environment.

Skin prick testing:

- is recommended as the primary method for the diagnosis of IgE mediated allergies in most allergic diseases
- has advantages of relative sensitivity and specificity
- provides rapid results
- has a relatively low cost
- has been found to show good tolerability in patients
- clearly shows patients what their allergies are.<sup>35</sup>

When performing skin prick testing, refer to the *Skin prick testing for the diagnosis of allergic disease: a manual for practitioners* published by the Australasian Society of Clinical Immunology and Allergy (ASCIA), available via [allergy.org.au](http://allergy.org.au).

### Interpretation of results

A positive skin prick test only indicates sensitisation (i.e. the presence of allergen specific IgE) and does not always equate to clinically relevant allergy. A positive skin prick test result must be interpreted in the context of clinical history, clinical signs and allergen exposure.<sup>38</sup>

In general, the larger the size of the skin prick test result, the greater the likelihood that it is clinically significant.<sup>38</sup>

### Adverse reactions to skin prick tests are rare

Minor discomfort and itch are common. Rarely, patients may experience marked swelling and discomfort at the site of the test. This can be treated with an antihistamine medication, a topical corticosteroid cream, an ice pack, or oral analgesics. Systemic reactions can also occur, but they are very rare when testing for aeroallergens.<sup>38</sup>

### Blood tests for serum specific IgE

Serum specific IgE in vitro allergy tests detect allergen specific IgE circulating in the bloodstream. Radio Allergo Sorbent Test (RAST) has now been mostly superseded by enzyme or fluorescence-based systems.<sup>39,40</sup>

Serum specific IgE tests can be used to diagnose all types of allergy, but is generally less sensitive and specific than skin prick testing. Traditional serum specific IgE testing has a sensitivity of approximately 70–75% for the detection of allergen-specific IgE.<sup>41,42</sup> Newer technology, such as ImmunoCAP, has higher sensitivity than traditional serum specific IgE tests.

Serum specific IgE testing is particularly useful when skin prick testing is contraindicated, and has the advantage that it may be ordered while waiting for specialist allergy review.<sup>38</sup>

For testing allergic triggers in asthma, serum specific IgE should be considered in situations where diagnosis of suspected allergic triggers by skin testing is impractical or unavailable<sup>43</sup>, including when the patient:

- is likely to be uncooperative with skin testing
- has recently taken antihistamines, tricyclic antidepressants or pizotifen (for migraines)
- has dermatographism (a physical urticaria) or extensive skin rash
- has an unusually high risk of anaphylaxis, for example, in cases of occupational asthma due to latex hypersensitivity.

#### Interpretation of results

Results of serum specific IgE tests:

- are not immediately available as they are performed in laboratories
- may give false negative or positive results when done for allergen mixes; therefore, the use of allergen mixtures for serum specific IgE is not recommended.<sup>38</sup>
- when negative, do not exclude that particular allergen as a trigger for asthma.

#### Unproven allergy tests

While our ability to accurately diagnose and treat allergic disease has benefited from scientific understanding of what happens during an allergic reaction, a number of scientifically unproven tests (such as Vega testing, iridology, kinesiography) have been promoted based on unconvincing scientific literature. When these tests have been formally assessed, they have shown poor correlation with the results of conventional allergy testing and no evidence of correlation with clinical disease.

Alternative allergy tests are not regulated in Australia or New Zealand. There is no Medicare rebate available, and there is no evidence to support their accuracy in diagnosing allergic disorders, including asthma. Unregulated and unproven allergy testing provides misleading results, delays correct diagnosis and leads to unnecessarily ineffective treatment. The Australasian Society of Clinical Immunology and Allergy (ASCIA) and a number of professional allergy/immunology organisations in Europe, the United States and South Africa advise against use of these tests for either diagnosis or to guide medical treatment.<sup>44</sup>

Additional information is available at:  
<http://www.allergy.org.au/health-professionals/papers/unorthodox-techniques-for-diagnosis-and-treatment>.



## When should you refer to a specialist?

Consider a referral to a specialist when:

- asthma is poorly controlled despite appropriate treatment and good adherence – including in a person with clinically confirmed allergy triggers
- other poorly controlled allergic diseases are present – e.g. when allergic rhinitis cannot be controlled with usual medication and avoidance measures
- occupational or work-related asthma/allergy is suspected or confirmed
- immunotherapy is contemplated
- food allergies are suspected
- prescription of omalizumab is contemplated – i.e. in adult patients with uncontrolled severe allergic asthma.

It is also important to ensure that the patient is using their medication correctly, including following correct device technique with their asthma inhaler and/or nasal spray.

## Medical management

A written asthma action plan should be used to document the long-term use of asthma medication, and how this should change depending on asthma severity. The plan should be reviewed on a regular basis.

### Asthma medications for people with allergies

Asthma treatment options for patients with asthma and allergies are generally the same as for those without concurrent allergies – i.e. bronchodilators (relievers) and inhaled corticosteroids (preventers).

Some preventer medicines may have a dual effect, reducing the inflammation associated with asthma as well as allergies, and therefore may be indicated in people with allergic triggers to their asthma. Such medicines include montelukast and omalizumab. Montelukast can be considered in those with allergic rhinitis and asthma that is mild persistent or frequent intermittent, or with exercise-induced asthma. Omalizumab is used for managing uncontrolled severe allergic asthma in adults and adolescents over 12 years, who are already using inhaled corticosteroids, and have elevated IgE levels.<sup>45</sup> Omalizumab can only be prescribed by a specialist.

### Medications for allergic rhinitis

For patients with mild intermittent allergic rhinitis, consider targeting predominant symptoms first.<sup>46</sup> However, if a patient is using an intranasal or oral H1-antihistamine, and does not experience symptom relief, switch to an intranasal corticosteroid.<sup>47-49</sup> Should continuous treatment be required, an intranasal corticosteroid is the first-choice treatment unless contraindicated.<sup>46,49</sup>

In adults with persistent allergic rhinitis or moderate-to-severe intermittent allergic rhinitis, prescribe or recommend intranasal corticosteroids – even if the person is already using regular inhaled corticosteroids for asthma. If symptoms are not adequately controlled by continuous intranasal corticosteroid treatment alone, consider adding an oral H1-antihistamine or short term intranasal decongestant – either as needed or as a course started pre-emptively before a period of predicted worsening of symptoms (e.g. pollen season).<sup>49</sup>

For children with asthma and allergic rhinitis, consider using montelukast as a first line preventer, as it has established benefit as asthma preventer and in allergic rhinitis.

For further information, see *Managing allergic rhinitis in people with asthma* available at [nationalasthma.org.au](http://nationalasthma.org.au).

### Medications that may trigger asthma

Some prescription and over-the-counter medications – such as aspirin, non-steroidal anti-inflammatory drugs and beta blockers – may also have adverse effects that trigger an allergic response or exacerbate asthma. Some complementary and alternative medicines may also cause serious allergic reactions, including echinacea,<sup>50,51</sup> bee pollen/propolis (Royal Jelly)<sup>52-55</sup> and garlic, some of which have been associated with rare case reports of fatalities.

## Allergen avoidance

Although there is limited evidence to support allergen avoidance to improve asthma control, it is reasonable to consider strategies to reduce allergen exposure in sensitised individuals.<sup>56</sup>

It should also be noted that such strategies are only worthwhile trying if:

- there is proven evidence of allergic sensitisation to a relevant aeroallergen
- exposure to the allergen has a clinically significant impact
- the patient (or parent/carer) is motivated to try allergen exposure reduction measures.

A single measure alone is unlikely to be effective. Also, efforts to avoid or reduce allergens can be costly, time-consuming or impractical, and may not improve asthma control.

Patients should be advised that allergen avoidance or reduction strategies should be used in combination with recommended treatment (e.g. preventer) and do not replace medical management.

## House dust mite

House dust mites, most commonly *Dermatophagoides pteronyssinus* (Dp), produce the major allergens associated with asthma in Australia. These microscopic mites live indoors, feed on skin scales, and thrive in temperate and humid climates such as coastal Australia.

Allergen particles produced by house dust mites (in their faecal pellets) are greater than 10uM. These particles require vigorous disturbance such as vacuuming to become airborne, and settle after 20–30 minutes.

Exposure of people with asthma who are allergic to high levels of dust mite allergen has been shown to increase:

- airway reactivity
- the risk of having recurrent asthma symptoms
- the risk of hospital readmission in children admitted for an asthma exacerbation.<sup>57</sup>

### House dust mite reduction measures

House dust mite reduction measures aim to:

- kill house dust mites
- remove the allergens they produce
- eliminate the places where they can live and breed.

### Bedding

Patients are most likely to be exposed to house dust mite in the bedroom and therefore this should be the focus for house dust mite reduction measures.

Measures that can be taken to reduce house dust mite exposure include:

- using mite-impermeable covers on mattresses, pillows and quilts – optimally, these should fully encase the item they are protecting, be washable and be washed periodically<sup>58,59</sup>
- washing bed linen (pillow cases, sheets, doona covers) in a hot wash (>55°C) on a weekly basis<sup>60</sup>
- using bedding products (e.g. pillows) manufactured with anti-microbial treatments that suppress fungal growth and dust mites
- avoiding blankets or doonas that cannot be regularly washed or encased
- removing unnecessary bedding such as extra pillows and cushions where dust mites might live and breed
- removing soft toys, or washing them in a hot wash (>55°C) on a weekly basis.

A hot wash will kill dust mites and wash away the allergen they produce. If washing in cold water, hot tumble drying of washed items for 10 minutes after they are dry will kill dust mites.<sup>61</sup> Dry cleaning is not as effective as it will kill house dust mites but not remove the allergen they produce.

### General cleaning

Where possible, the patient should be absent while household cleaning (in particular vacuuming<sup>62</sup>) is being carried out and for at least 20 minutes thereafter.

Possible measures for general cleaning include:

- vacuuming rugs and carpets weekly using a vacuum with a high-efficiency particulate air (HEPA) filter
- cleaning hard floors weekly with a damp or anti-static cloth, mop or a steam mop and dusting weekly using a damp or anti-static cloth
- considering venetian blinds or flat blinds, which are easier to clean than heavy curtains. Washable curtains or external shutters are other options.

### Other measures

The role of carpets in house dust mite exposure is complex. While removal of carpets in favour of hard floors is sometimes recommended, this has not been demonstrated to reduce the level of house dust mite exposure in the home.<sup>63</sup> Carpet construction, density and age need to be considered<sup>64</sup> – e.g. modern carpets manufactured with anti-microbial treatments do not provide an attractive environment for dust mites. Ensure thorough weekly vacuuming with an appropriate appliance is being undertaken before considering more drastic steps.

Reducing humidity in the home environment<sup>65–67</sup> with a dry and well-ventilated house with adequate floor and wall insulation is also another option. Air conditioners or dehumidifiers (but not evaporative coolers) may be beneficial, particularly in more humid areas as they lower the relative humidity.

There is limited information on the effectiveness, safety and practicality of acaricide sprays.<sup>68–70</sup>

## Animals

In asthma patients sensitised to pets, exposure to pet allergens can be a potent trigger of asthma. This exposure can precipitate asthma symptoms<sup>71</sup> and/or worsen asthma control.<sup>72</sup>

Cats and dogs are a major source of allergens in the home environment. The allergens come from the sebaceous glands in cats and the salivary glands in dogs.

As all cats and dogs have sweat and salivary glands there are no breeds that do not have allergens, although the amount of allergen released can vary between breeds.

As allergens adhere to the pet's own skin or hair, they become airborne for prolonged periods when the pets shed their hair. Some breeds of animal shed less, which may be beneficial.

Cat allergen is ubiquitous and difficult to eliminate even after removal of the cat.<sup>73</sup> It is carried from place to place on clothing, and can therefore be found in places where cats have never lived such as schools and offices.<sup>74</sup>

## Pet allergen avoidance

The most effective method of allergen avoidance for people with asthma who are allergic to cats or dogs is removal of the pets from the home. However, it is important to note that the allergen can persist for many months, or even years, after the pet has been removed.

If the pet cannot be removed, then it should be kept outside most or all of the time, making sure the pet has a safe, warm home outdoors. If the pet must be kept inside, it should be limited to one area of house and should not be allowed into the patient's bedroom.

Other allergen reduction measures include:

- washing hands after touching or feeding the pet and washing clothing, and pet and human bedding regularly in hot water (>55°C)
- keeping pets off carpets, rugs and soft furnishings
- vacuuming carpets, curtains and upholstery regularly using a vacuum with a motorised brush and a HEPA filter<sup>75</sup>
- cleaning hard floors with a damp/anti-static cloth or a steam mop, and cleaning air-conditioning or heating ducts
- grooming pets regularly (where possible, the patient should be absent while this occurs), and washing pets regularly, but no more than the vet recommends

A Cochrane systematic review of interventions to reduce exposure to pet allergens concluded that there was insufficient evidence to recommend the use of air filtration units to reduce allergen levels in the management of pet allergic asthma.<sup>76</sup>



## Pollen

Allergy to airborne pollen grains from certain grasses, weeds and trees is common in people with asthma in Australia.

Exposure to pollen:

- may worsen asthma symptoms during the pollen seasons<sup>77</sup> (the highest pollen counts occur on calm, hot, sunny days in spring, early summer or during the dry season in tropical regions)
- can cause outbreaks of asthma attacks after thunderstorms (as the moisture releases smaller starch granules that may be inhaled deep into the airways)<sup>78</sup>
- is usually caused by imported grasses, weeds and trees, which are wind pollinated – the pollen can travel many kilometres from its source
- is not usually caused by Australian native plants (although there are exceptions, such as Cypress Pine)
- is not usually caused by highly flowered plants as they produce less pollen (which is transported by bees) than wind pollinated plants.

### Pollen allergen avoidance

Completely avoiding pollen can be difficult during the pollen season but the following steps may help reduce exposure:

- avoiding going outdoors on days with high pollen counts (particularly 7–9am and 4–6pm), on windy days or after thunderstorms
- keeping car windows closed, ensuring the vehicle has a pollen cabin air filter and setting the cabin air to recirculate
- showering (or washing face and hands thoroughly) after being outside with exposure to pollen
- drying bed linen indoors during the pollen season
- holidaying out of the pollen season or at the seaside
- not mowing the grass, and staying inside when it is being mown
- wearing a facemask and/or glasses in special situations where pollen can't be avoided, e.g. if mowing is unavoidable
- removing any plants the patient is sensitive to from their garden, and consider planting a low allergen garden.

## Mould

Like other environmental allergens, indoor exposure to mould has been shown to correlate with wheezing and peak flow variability.<sup>79</sup>

Fungal exposure occurs both indoors and outdoors. Exposure to moulds such as *Alternaria* increases the risk of asthma symptoms and airway reactivity in sensitised children and the risk of sudden respiratory arrest in sensitised young adults with asthma.<sup>80,81</sup>

### Mould avoidance measures

Air filters and ionizers have been shown to reduce airborne mould; however, a direct effect on asthma control has not yet been shown.<sup>82</sup>

Other measures that may reduce exposure include:

- removing visible mould by cleaning with bleach or other mould reduction cleaners. If sensitive to strong odours, a mask should be worn while cleaning or a family member/friend asked to help instead
- using high-efficiency air filters – these may be integrated in air-conditioning or heat-recovery ventilation systems or in stand-alone air purifiers<sup>83</sup>
- ensuring adequate natural ventilation including the use of extractor fans
- sealing leaks in bathrooms and roofs
- clearing overflowing gutters and blocked under floor vents
- removing indoor pot plants (which promote mould growth)
- drying or removing wet carpets
- treating rising damp as soon as it is detected
- avoiding the use of organic mulches, and compost heaps.

## Specific allergen immunotherapy (desensitisation)

Desensitisation with specific allergen immunotherapy (sublingual immunotherapy or subcutaneous immunotherapy) may be appropriate for patients with a clinical history of problematic allergy and a documented positive allergen-specific IgE test.<sup>84</sup> It should only be prescribed by an allergy specialist (allergist or clinical immunologist).

Both forms of specific allergen immunotherapy require at least 3 years of treatment, however, it is unclear which patients will benefit most.<sup>46</sup> Sublingual immunotherapy is generally better tolerated than subcutaneous immunotherapy.<sup>84</sup>

Once immunotherapy has been successfully initiated by the specialist, co-management with the patient's GP can be considered.

### Sublingual Immunotherapy

Sublingual immunotherapy is effective for the treatment of allergic asthma in adults<sup>84,85</sup> and for allergic rhinitis in adults and children aged 5 years and over.<sup>84,86</sup>

It is especially effective in those with allergies to grass pollens or house dust mite.<sup>84</sup>

It involves taking small amounts of medication that is held under the tongue for 2 minutes. The maintenance doses can be reached quite quickly (usually over the course of several weeks).

Sublingual immunotherapy is generally very well tolerated, however side effects can occur and include: an unpleasant taste, localised swelling in the mouth, abdominal pain and nausea. Local adverse effects can occur<sup>84</sup> and are common in children receiving sublingual immunotherapy.<sup>46</sup>

Systemic adverse reactions, such as anaphylaxis, are very rare (estimated as 1.4 serious adverse events per 100,000 doses),<sup>46,84</sup> and the majority of adverse events occur soon after beginning treatment.<sup>84</sup>

### Subcutaneous Immunotherapy

Subcutaneous immunotherapy needs to be administered under close medical supervision, either in a hospital setting or at a doctor's office where appropriate facilities to treat systemic reaction are available. It involves injections in which the dose is gradually increased on a regular basis (usually weekly), or until a therapeutic/maintenance dose is reached. This can take approximately 4–6 months.<sup>87</sup>

It is effective for the treatment of allergic asthma<sup>84,88</sup> and allergic rhinitis, especially in adults with allergies to pollens.<sup>46</sup> It may also be effective in adults with allergies to animal dander, house dust mite and some fungi.<sup>84</sup>

Subcutaneous immunotherapy is associated with local adverse effects which may occur in up to 10% of patients (e.g. injection-site swelling) and, less frequently, serious systemic adverse effects (e.g. anaphylaxis).<sup>46,84</sup>

For more detailed information, refer to the TSANZ and ASCIA position statement on immunotherapy and asthma available via the ASCIA website: [allergy.org.au](http://allergy.org.au).

## Preventing development of asthma

### Factors associated with an increased incidence of asthma

Several factors associated with development of asthma have been identified. However, it remains uncertain whether manipulation of these factors can reduce the onset and duration of asthma.

#### 1. Genetics

Several genes associated with increased risk of asthma have been identified,<sup>89</sup> and asthma risk may be increased by the interaction between asthma susceptibility genes and environmental factors.<sup>90</sup> In addition, a family history of allergy is associated with a high risk of allergic disease, including asthma.<sup>91</sup>

In general, asthma is more likely to develop if there is:

- a family history of atopy or asthma<sup>13</sup>
- a personal history of atopy or other allergic disease such as atopic dermatitis.<sup>92,93</sup>

Ongoing asthma at 6 years of age is associated with the presence of atopy and a maternal history of asthma.<sup>13</sup>

#### 2. Allergic rhinitis

Rhinitis is a major risk factor for asthma and often precedes it.<sup>94-96</sup> Childhood allergic rhinitis increases the likelihood of new-onset asthma after childhood and the likelihood of having persisting asthma from childhood into middle age.<sup>95</sup> Non-allergic rhinitis is also a predictor of adult-onset asthma.<sup>96</sup>

#### 3. Allergen sensitisation and exposure

Many studies have shown that sensitisation to environmental allergens is strongly associated with childhood asthma,<sup>97-102</sup> however the potential benefit of allergen avoidance in prevention of asthma is unproven. It is important to distinguish between the application of allergen avoidance measures for primary prevention of asthma development, and its use in secondary prevention of symptoms in people with established asthma who are already sensitised to allergens.

House dust mite avoidance measures alone are unlikely to prevent a child from developing asthma, and avoiding inhalant allergens during pregnancy has not been shown to reduce allergic disease, and is not recommended.<sup>91</sup>

A recent Cochrane study also reported that while reduction of the exposure to multiple allergens reduced the likelihood of a diagnosis of asthma, the same conclusion was not found in the single intervention studies examined. The effect on parent reported wheeze was found to be inconsistent, with no significant impact on night-time coughing or breathlessness.<sup>103</sup>

For more information on allergen avoidance measures in secondary prevention see the section *Management-Allergen avoidance*.

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**If a family already has pets it is not necessary to remove them, unless the child develops evidence of pet allergy (as assessed by an allergy specialist).<sup>91</sup>**

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For food-related allergen sensitisation, the current recommendations from ASCIA are outlined below<sup>104</sup>:

- excluding allergenic foods from the maternal diet is not recommended as there is no evidence that this prevents allergies
- introducing solid foods from around 4–6 months while still breastfeeding is supported by current evidence published in peer reviewed journals affiliated with professional paediatric and allergy/immunology medical organisations
- giving one new food at a time is advised; if a food is tolerated, continue to give this as a part of a varied diet. If there is any reaction to any food, you should investigate further, and that food should be avoided until the child is reviewed by a medical practitioner with experience in food allergy.

For detailed advice, see ASCIA's Infant Feeding Advice position statement available at [allergy.org.au](http://allergy.org.au).

#### 4. Smoking

Exposure to cigarette smoke and maternal smoking during pregnancy significantly increases the risk of wheezing illness in early childhood, but probably does not increase the risk of atopic asthma later in life.<sup>13,105,106</sup>

Smoking in pregnancy affects foetal lung growth, leading to a reduction in lung volume and capacity. Smoking is an epigenetic risk factor – smoking by grandparents has been associated with increased risk of early childhood asthma, indicating an epigenetic dysfunction might contribute to subsequent generations.<sup>107</sup>

Advise women not to smoke while pregnant, and advise parents/carers to ensure babies and children are not exposed to cigarette smoke. Additionally, advise all patients to quit smoking (where applicable) and to avoid passive smoking. For patients who continue to smoke provide encouragement, support and resources to help them quit; see *Further Information*.<sup>104</sup>

## Factors associated with a reduced incidence of asthma

### 1. Breastfeeding and diet

While breastfeeding is recommended for the first 6 months (where possible), there is emerging evidence that prolonged exclusive breastfeeding does not protect against development of asthma, allergic rhinitis<sup>108</sup> or other allergic disease such as eczema.<sup>109</sup>

There is no evidence that dietary restriction during the third trimester of pregnancy or while breastfeeding is beneficial for the prevention of allergic disease. It may even result in an increased incidence of allergic disease.<sup>110-113</sup>

### 2. Viral and bacterial infections in childhood

Study findings suggest that an increased incidence of infections in infancy may protect against the development of asthma. The 'hygiene hypothesis' has been proposed to explain this. The hypothesis suggests that reduced exposure to infections results in persistence of 'pro-allergy' immune responses that in turn lead to an increased susceptibility to allergic disease.<sup>114,115</sup>

Data from an Australian longitudinal cohort study suggest that, overall, childhood infectious diseases protected against asthma persisting in later life. However, pertussis and measles were associated with new-onset asthma in adulthood.<sup>116,117</sup>

When considering the impact of viral and bacterial infections, the type of infection, severity, and timing also needs to be considered. Therefore keep in mind that children may get a cold which could be unrelated to asthma, and that the home should not be over-sanitised by cleaning products.

### 3. Exposure to farm environments

Studies have shown that early exposure to farming environments and farm animals may prevent development of allergic disease, including asthma. However, further studies are required before conclusions can be made.<sup>118-122</sup>

### 4. Gut flora and probiotics

In a prospective, randomised, placebo controlled study, *Lactobacillus GG* given to pregnant women during gestation and to their infant offspring for the first 6 months of life protected against the development of atopic eczema in the first year of life.<sup>123</sup> Other studies have not shown any significant effect of maternal ingestion of probiotics, and that at present, routine use cannot be recommended.<sup>124</sup>

## 5. Immunotherapy for rhinitis

Emerging evidence suggests that immunotherapy for inhalant allergens reduces the rate of development of new sensitisation to other inhalant allergens and the rate of progression from rhinitis and asthma.<sup>86</sup>

### Current suggestions

The following suggestions for preventing development of asthma are based on a summary of the evidence. It is important to note that even if these suggestions are carried out, there is still a significant possibility that high-risk infants will develop asthma.

#### 1. Breastfeed for the first 6 months of life<sup>104</sup>

- although the evidence for breastfeeding in primary prevention is not strong, breastfeeding is recommended, as it is still beneficial for many other reasons.
- if a mother is unable or does not wish to breastfeed, a partially hydrolysed formula in the first 4–6 months of life is suggested as an alternative. However the evidence of benefit in primary prevention is still undergoing investigation.
- there is not a lot of evidence to support the delayed introduction of complementary solid foods beyond 6 months to reduce the risk of allergy.

#### 2. Avoid smoking and exposure to smoke during pregnancy and infancy

- The most important advice to recommend to patients is to avoid maternal smoking during pregnancy and exposure to cigarette smoke during all stages of life.
- Note: The role of vitamin D, antibiotic use and paracetamol are areas also being investigated.

For further information see the latest edition of the National Asthma Council Australia's Asthma Management Handbook available at [nationalasthma.org.au](http://nationalasthma.org.au).



## Asthma and Allergies Resources

Australasian Society of Clinical Immunology and Allergy:  
[allergy.org.au](http://allergy.org.au)

*Managing allergic rhinitis in people with asthma.*

National Asthma Council Australia, 2012.

Available at [nationalasthma.org.au](http://nationalasthma.org.au)

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## Further Information

Visit the National Asthma Council Australia website at:  
[nationalasthma.org.au](http://nationalasthma.org.au)

A matching patient resource is also available via the National Asthma Council Australia website.

Although all care has been taken, this information paper is only a general guide; it is not a substitute for assessment of appropriate courses of treatment on a case-by-case basis. The National Asthma Council Australia expressly disclaims all responsibility (including negligence) for any loss, damage or personal injury resulting from reliance on the information contained.

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## References

References are listed in the online version of this information paper, on the National Asthma Council Australia website, [nationalasthma.org.au](http://nationalasthma.org.au)