House dust mite allergy, rhinitis and asthma.

Dr. David Heyworth-Smith
Clinical Immunologist and Allergist

Topics
- House dust mite biology
- House dust mite allergy in rhinitis and asthma
- Diagnosis of allergy
- Treatment of allergic rhinitis

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Rhinitis

Allergic rhinitis
- Seasonal AR – allergy caused by seasonal allergens more often outdoor allergens, e.g. grass and tree pollen
- Perennial AR – allergy caused by perennial allergens more often indoor allergens, e.g. dust mite, pet dander, but sometimes also pollens in QLD
- Intermittent vs Persistent
- Mild, Moderate or Severe

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DHS
- Than-you for inviting me
- Clinical Immunologist
- No conflicts of interest

Colin F Robertson, Marita F Dalton, MJA 1998; 168: 434-438


RNS, perennial allergic rhinitis
SAR, seasonal allergic rhinitis
New AR classification:

Intermittent
- < 4 days per week
- or < 4 weeks

Moderate-severe
- one or more items:
  - abnormal sleep
  - impairment of daily activities, sport, leisure
  - abnormal work and school
  - troublesome symptoms

Persistent
- ≥ 4 days per week
- and ≥ 4 weeks

Mild
- normal sleep
- & no impairment of daily activities, sport, leisure
- & normal work and school
- & no troublesome symptoms

1999 WHO ARIA recommendations:

- Depending on the subdivision and severity of AR, a stepwise therapeutic approach has been proposed
- The treatment of AR combines:
  - allergen avoidance (when possible)
  - pharmacotherapy
  - immunotherapy
  - education
- Patients with persistent AR should be evaluated for asthma by history, chest examination and, if possible and when necessary, the assessment of airflow obstruction before and after bronchodilator
- Patients with asthma should be appropriately evaluated (history and physical examination) for rhinitis
- A combined strategy should ideally be used to treat the upper and lower airway diseases in terms of efficacy and safety

Allergy diagnosis in rhinitis and asthma

- Detection of allergen specific IgE

Skin prick allergy test.

"RAST" test → solid matrix fluorescent enzyme immunoassay

Specific IgE / RAST

Pathology request

Patient details: Mr Snuffle Upagus DOB ………

Test: Specific IgE / RAST – house dust mite, grass pollen mix, alternaria (or cat/dog if patient has a pet)

Requestor: Dr A. Lerry

Aeroallergens:

- House dust mite
- Grass pollens
- Moulds
- Cockroach
- Weed pollens
- Tree pollens
- Animal dander (cat > dog)
- Other airborne allergens

- The presence of 100 mites per gram of house dust is sufficient to sensitize an infant. For around 500 mites sensitized patient shows a greater risk of developing asthma at a later date. The higher the number of mites in dust, the earlier the first episode of wheezing.

House dust mite

- Many species
  - Dermatophagoides pteronyssinus
  - Dermatophagoides farinae
  - Blomia tropicalis
  - Lepidoglyphus destructor
  - Euroglyphus destructor
- Warmth - 25° C
- Humidity – 70-90%
- Dust
- Bedding, clothes, curtains, soft toys, flooring – carpet
- Mite allergens (proteases) are present in mite bodies, secreta, excreta – highest concentration in faecal particles
Links between allergic rhinitis and asthma

• Anatomical – “one airway”
• Epidemiological
  – Co-existent disease
  – AR is a risk factor for later asthma development
• Mucosal allergen exposure – allergic inflammation has a systemic component:
  – Non-asthmatic atopic subjects with rhinitis show increased eosinophilic infiltration of the bronchial mucosa
  – Endobronchial challenge can produce nasal as well as bronchial symptoms
  – Nasal allergen challenge can induce bronchial inflammation

Links between allergic rhinitis and asthma

• Possible effects of impaired nasal air conditioning in AR on lower airway function
• Treatment of AR has shown to reduce asthma morbidity in large (n=20 000) combined retrospective cohort studies.

Treatment of allergic rhinitis

• Allergen avoidance measures
• Antihistamines
  – Oral
  – Intranasal
• Corticosteroids
  – Intranasal
  – Oral / systemic
• Leukotriene antagonists
• Immunotherapy (allergen desensitisation)
  – Subcutaneous
  – Sublingual

Stepwise progression in treatment of A.R.

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<th>Mild</th>
<th>Moderate</th>
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<tr>
<td>Allergen avoidance</td>
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<tr>
<td>Antihistamine</td>
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<td>Intranasal corticosteroids</td>
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<tr>
<td>Specific Immunotherapy</td>
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Allergen avoidance measures:

• Bedding covers
• Flooring modification
• Removal of soft toys
• Washing linen at > 55°C
• Acaricide sprays
• Air filtration
• Stay indoors on high pollen count days
• Avoid animal exposure / pet ownership

Anti-histamines (H1)

• Non-sedating (2nd generation) antihistamines
  – Safe. No or minimal CP450 effect / non-cardiotoxic.
  – Effective in mild – moderate AR, good data.
  • Loratidine
  • Desloratidine
  • Cetirizine
  • Fexofenadine
  • etc
  • Azelastine
    Nasal antihistamine spray
Corticosteroids

- Corticosteroids are the most potent pharmacological agents (i.e. excluding immunotherapy) for treatment of AR
- Oral corticosteroids may be used infrequently and short term for severe obstructive symptoms
- Intranasal corticosteroids (INC) provide the best risk/benefit ratio
- Care with HPA axis suppression with intranasal corticosteroids added to pulmonary inhaled steroids in children (although studies indicate safety)
- In moderate to severe A.R. some patients will not obtain control even with combinations of antihistamines and INC.

Leukotriene antagonists

- Block effects of leukotrienes at the cysteinyl leukotriene 1 (CysLTR1) receptor
  - Montelukast (Singular)
- Effective in:
  - Allergic rhinitis
  - Asthma
  - Asthma and allergic rhinitis
- In Australia available on the PBS for treatment of asthma
- Non-PBS relatively inexpensive

Immunotherapy

- Previously “desensitisation”, now “allergen immunotherapy” is preferred term
- Induction of tolerance to previously symptom inducing allergens through induction of non-allergic immunological changes:
  - T regulatory cells
  - IgG4 up regulation
  - IgE down regulation
- Proven benefit in:
  - Allergic rhinitis and allergic asthma – large numbers of RCTs demonstrating benefit
  - Benefits include symptom control and reduction in concomitant medication use

Indications for immunotherapy:

- Patients with allergic rhinitis / allergic asthma with specific IgE sensitisation
- Incomplete symptom relief from allergen avoidance / antihistamine / intranasal corticosteroid treatment
- Patients who wish to avoid open-ended pharmacological treatment or have undesirable side-effects from pharmacological treatment

ACARIZAX: clinically proven effectiveness in both AR and AA¹–⁴

- Population: HDM AR ± asthma in an EEC
- Primary endpoint outcome: Efficacy by 8 weeks and nasal symptoms (TNSS) reduced by 49% at 24 weeks (p<0.001 vs placebo) with treatment effect seen from Week 14

- Population: HDM AR ± asthma
- Primary endpoint outcome: Reduced rhinitis symptoms and medication use during last 8 weeks of treatment (p=0.001, vs placebo), with treatment effect seen from Week 14

- Population: HDM AR + HDM AA
- Primary endpoint outcome: 34% reduced moderate or severe asthma exacerbation risk (p=0.017, vs placebo during the ICS withdrawal period)

AA - Allergic Asthma; AR - Allergic Rhinitis; EEC - Environmental Exposure Chamber; HDM - House Dust Mite; ICS - Inhaled Corticosteroids; TNSS - total nasal symptom score.


Immunotherapy

- Subcutaneous immunotherapy (SCIT)
  - Induction: Weekly injections for between 6-12 weeks
  - Monthly injections for 3 years
  - Medical centre visits for injections because of low risk of systemic reactions
  - Risk of acute bronchospasm in asthmatic patients at time of injection
    - Non-PBS. Variable cost ~ $50/month
    - I prefer to avoid in children <12 years of age
    - Good efficacy data for HDM, pollens, cat, dog
    - Preferred if mould spore immunotherapy is required
Immunotherapy

• Sublingual immunotherapy (SLIT)
  – Daily oral (sublingual) drops or tablet
  – Taken at home
  – Duration 3 years
  – Good safety data including in asthma
  – More expensive than SCIT
  – Non-PBS. Cost $50-$90 per month
  – Well tolerated by children
  – Infrequent mild oral allergic symptoms at first few doses
  – First dose should be administered under medical supervision

Immunotherapy

• Pros:
  – Long term remission of allergic disease (2-10 years)
  – Symptomatic improvement
  – Reduction in medication
  – Pharmaco-economic benefit
  – May prevent allergic progression in children (i.e. prevent asthma in children with rhinitis)

• Cons:
  – Modestly intensive and modestly expensive (up-front) programmes
  – Acute allergic reactions (SCIT)
  – “Efficacy” 75% to 25% decreasing with increasing age
  – Can make eczema worse in the short term (but may be beneficial in the long run)

Immunotherapy Treatments

• Unfortunately: A confusing multiplicity of treatments that are not easily interchangeable due to lack of standardised components, concentrations and protocols.

SCIT
- Aqueous
- Alum
- Allergoids

SLIT
- Liquid
- Tablet

Stallergens
Holister Stier
ALK
Immunotek
Western Allergy
Sequiras
Allpyral, Alustal, Alutek, Clustoid, Staloral, Actair, Oralair, Acarizax, etc.

Surgery for allergic rhinitis:

A role where maximal medical management has failed and in specific cases including:

• Significant adenoidal hypertrophy
• Turbinate hypertrophy
• Bilateral Concha Bullosa
• Refractory nasal polyposis