INVESTIGATING INFLAMMATORY AIRWAY DISEASE IN CHILDREN

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The prevalence of allergy is increasing worldwide, particularly in urbanised communities. Asthma is thought to occur in at least 1 in 10 people, and allergic rhinitis may occur in 1 in 5, irrespective of race or socio-economic status. Therefore, all family practitioners, irrespective of which communities they serve, will probably see patients with asthma and allergic rhinitis every working day. In many instances diagnosis is easy, but sometimes the diagnosis is difficult to make, and investigations will help to confirm the diagnosis of allergy and the attendant inflammatory airway disease. The wide range of allergy tests available requires a logical approach to selecting the most cost-effective and appropriate test for each individual.

The examination of a child with asthma may often reveal no abnormality when he or she is well. Auscultation may reveal wheezing, rhonchi, harsh breath sounds or just prolonged expiration. A hyperinflated chest is a good clue in an otherwise normal patient. Clinical features of allergic rhinitis are allergic facies characterised by pallor, allergic shiners, mouth breathing and a nasal crease. The eardrums can be dull and retracted, the nasal mucosa pale (or hyperaemic) and swollen with mucus, and the throat may have a granular pharyngitis with a postnasal drip. This pharyngitis is characterised by hyperaemic mucosa with raised blebs of shiny mucosa. Asthma should be looked for in a child presenting with allergic rhinitis, and vice versa, as they commonly occur together.

Confirmation of the presence of atopy
Atopy has been redefined as ‘a personal or familial tendency to produce IgE antibodies in response to low doses of allergens, usually proteins, and to develop typical symptoms such as asthma, rhinoconjunctivitis, or eczema/dermatitis’.3

Tests available to investigate the presence of atopy are:

1. **Total IgE.** This is often used as a screening test, but its use is limited because:
   a. normal reference values are not available for all populations;6
   b. it has poor sensitivity and specificity;6
   c. non-allergic conditions (e.g. parasitic infestations) can produce elevations.6 (The same limitations apply to the absolute eosinophil count.)

2. **Phadiatop®.** This is the most reliable in vitro test for screening of patients for sensitivity to inhaled allergens. The sensitivity in South African children is 100% and specificity is 90%.3 It does not detect and is therefore not influenced by parasitic IgE.

Disadvantages are:
   a. only a positive or negative result is obtained, without identification of the specific aero-allergens;
   b. cost.

Identification of the specific allergen
Both in vivo (SPT (skin-prick test)) and in vitro (CAP RAST®) tests are available to investigate allergy.

1. **Radio-allergosorbent test (CAP RAST®).** The RAST, which also tests for allergen-specific IgE, can be used either for single individual allergens or for mixes of similar, related allergens.1 In practice, patients may react to groups of allergens, to cross-reacting allergens, or only to individual allergens within a specific group. For this reason, mixed-allergen tests have been developed; 460 individual allergen and 66 mixed-allergen CAP RASTs are available. A thorough history will guide one to careful selection of the correct tests to perform. Table I outlines a suggested route for allergy screening in different regions and populations in South Africa. Figure 1 is the allergy test request form and provides an example of what is available.

2. **CAST testing.** In vitro stimulation of a patient’s leukocytes with relevant antigen will result in

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Table I. Suggested in vitro allergy screening tests for different regions in South Africa

Positive Phadiatop test
Perennial allergy
House-dust mite, Cat, Dog, Mould mix, Cockroach (Durban), F x 5 (young children)
Seasonal allergy
G x 2 mix (including Bermuda), Tree mix, Acacia (savannah regions), Weeds (English plantain), Western blotting for individual indigenous grass sensitivities

Negative Phadiatop test
If total serum IgE elevated: proceed to more exotic allergen testing (SPT or CAP RAST), e.g. occupational allergens
If total serum IgE not elevated: allergy unlikely
1. If grass pollen immunotherapy is contemplated, a detailed appraisal of the specific grass pollen-specific immunotherapy is required and testing should specifically include SPT or CAP RASTs for rye grass, Bermuda grass and Timothy grass.
2. Allergy to Kikuyu, Buffalo or Eragrostis is common, but vaccines are not yet available.

Fig. 1. Allergy test request form.
leukotriene release in an allergic subject. This test objectively measures this reaction. There is good correlation between CAP RAST and CAST in many clinical situations. However, in certain cases, such as apparent allergic reactions to drugs, food additives and colourants, where a specific IgE response cannot be demonstrated, the CAST assay may have great potential as a diagnostic tool.

3. **Skin-prick testing.** The SPT is regarded as the gold standard for the diagnosis of allergy.8-10 It has many advantages over the in vitro tests: a. reliability, particularly for aero-allergens; b. easy to perform in the doctor’s consulting rooms; c. rapid results (within 10-15 minutes); d. low cost. Only a limited number of SPTs need to be performed (usually dog, cat, grasses, trees, and house-dust mite (HDM)).

**Monitoring the effects of allergic inflammation on the patient**

As allergy is an inflammatory condition, tests have been developed to diagnose the presence of inflammation and also to monitor therapy. Many of the tests are new, and require further evaluation before they can be recommended for widespread use. They include activated eosinophil counts, eosinophil cationic protein (ECP),11 mast cell tryptase, and histamine and cytokine assays. Possibly the best measures of the effects of allergic inflammation are clinical symptoms and signs, including lung function testing in older asthmatics (>5 years).

**Evaluation of the patient’s environment**

When taking an allergy history, specific questions about the environment should include:12 a. exposure to cigarette smoke – active or passive; b. animal contact (especially cats) – home, neighbour, school, etc.; c. feathers in the patient’s bed – pillows or duvet; d. presence of fluffy toys; e. proximity of home to water – in drier regions of South Africa, living near water may be associated with higher HDM counts, and consequently greater sensitivity.

Testing is now available for HDM levels (a vacuum bag sample can be sent for ELISA assay) and should probably be performed before an HDM-positive patient is subjected to costly HDM avoidance measures.

**REFERENCES**