Allergy Tests & their application in Clinical Management

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Overview

• Definitions
• Indications for tests
• Investigations both available and unavailable in Kenya and rationale for their use (_stamp shows which tests available locally)
• A touch on Kenyan perspective & experiences
• Conclusion
ALLERGY

• Inappropriate exaggerated reaction of the immune system against generally innocent dietary, environmental and other agents causing inflammation, tissue damage & disease.

• Generally all hypersensitivity states may be termed allergies. Mainly Type 1 Hypersensitivity states – mediated by IgE antibodies will be discussed.

UNPRECEDENTED IMMUNOLOGICAL WAR AGAINST INNOCENT VICTIM, harming SELF therefore PATHOLOGICAL
ATOPY

- Atopy is the genetic predisposition to develop allergic diseases.
- Characterised by a **T\textsubscript{H}2 driven environment** (this also occurs in materno-foetal phase to prevent rejection and for immunity against parasitic diseases) resulting in **IgE antibody responses**.
- Sensitization = presence of specific IgE antibody to an allergen
- Normal individuals have T\textsubscript{H}1 driven responses and do not react to innocent foreign substances in the same way as an atopic.
Allergen-specific IgE antibodies

TH2 differentiation and memory

Eosinophil proliferation and recruitment to tissues

THE IMMUNOLOGY OF IgE-mediated ALLERGY
• Food allergy requires immune system to be activated by specific immunological responses:
  – IgE mediated (majority of patients with food allergy)
  – non-IgE mediated – immunoglobulin, immune complex or cell-mediated immunity (less well understood). Usually GI manifestations
  – Mixed - Both antibody and cell-mediated immunity
• Reactions may be immediate (usually IgE mediated) or delayed (non-IgE mediated)
Immunological mechanisms result in:

+ Itching, discharge & shock

INFLAMMATION

HEAT  REDNESS  SWELLING  PAIN  LOSS OF FUNCTION

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Naini Diagnostic Laboratory
THE ALLERGIC MANIFESTATIONS

Hives

Angioedema

Anaphylaxis

A severe type of allergic reaction that involves two or more body systems (e.g., hives and difficulty breathing).
IT'S NOT WHAT BUT WHY YOU DO IT
Indications for Investigations in an Atopic

• Classical atopic symptoms where **PATIENT** seeks **CAUSE** – Dr Google
• Classical atopic symptoms where **DOCTOR** seeks **CAUSE**
• Which are difficult to treat and manage, uncontrolled symptoms, optimal pharmacological Rx
• Frequent secondary infections
• Unexplained symptoms eg rashes, urticaria/angioedema, FTT, GI symptoms
• Moderate to Severe disease, progressing
• Food allergy considered and dietary manipulation required
• Patients would benefit from aeroallergen control measures if aeroallergy (microscopic allegens)
• Selection of Immunotherapy
• Patients on self prescribed eliminations to liberate diet
• Follow up to assess whether allergic patient has become tolerant
• Anaphylaxis
• And of course, to help patients identified as high risk of the Allergic March (allergens can change along the march)

Progressive allergic diseases over time eg from food allergy, to skin disease and later, airway allergies. Similarly from uncontrolled rhinitis to sinusitis and lower airways allergic disease – asthma. This march may be halted by good allergen control (dietary and environmental), pharmacotherapy and immunotherapy.
INVESTIGATIONS

• Starts with ‘HISTORY, HISTORY, HISTORY...’ This helps guide the investigative process

• The investigations used in allergies depend on the availability of different services in Africa:
  – NON-SPECIFIC TESTS raise allergic disease as a differential diagnosis in context of clinical findings. They cannot offer exact cause of the allergies.
  – SPECIFIC TESTS detect specific IgE antibodies directed against causative food, drugs, aeroallergens, cosmetics, insect stings etc.
Non Specific Tests

These tests indicate underlying allergic process but there are other differentials to be considered:

- Blood Eosinophilia
- Tissue Eosinophilia
- Total serum IgE
- Serum tryptase test
- Exhaled NO
- Pulmonary function tests
• **Total serum IgE** is a useful marker that an allergic process is underway, but is only raised when large surface area is affected by allergies. Only 1/3 of allergic rhinitis show raised levels. Usually not raised in solitary GI disease

• Also raised in parasitic infections, AIDS & smoking

• Only quantifies unbound circulating IgE

• Does not measure local tissue IgE

• With regards to monitoring disease, poor correlator of response to treatment in asthma/rhinitis

• Cord blood IgE can be high – indicator of atopy
• **Eosinophilia** is useful indicator but can occur in helminth infestation, some CT diseases, leukemia, hyper IgE syndrome, mastocytosis

• Tissue eosinophilia is good indicator of allergic disease; such as nasal, bronchial secretions and GIT

• Useful in monitoring response to pharmacotherapy
• **Fractional exhaled nitric oxide**: quantitative marker of allergic inflammation in epithelia of smaller airways in asthma. Very little NO produced by healthy epithelia.

• For therapeutic monitoring and assessing steroid responsiveness, and research.
• **Mast cell Tryptase.** Anaphylaxis is mediated predominantly by mast cell tryptase. Raised in samples at autopsy if death from anaphylaxis. It is reported that it is less likely to rise in food induced anaphylaxis (limited data).

• β tryptase release is IgE dependant and best marker of systemic mast cell activation in anaphylaxis (more specific than total tryptase).

• Samples need to be taken within 4h then serially.
Identification and removal of the cause (allergens) improves symptoms by reducing inflammation.

**RATIONALE FOR THE USE OF SPECIFIC TESTS**

Identification and removal of the cause (allergens) improves symptoms by reducing inflammation.
Identify the relevant allergens to test

• Detailed clinical, dietary history, occupational history & examination are vital for rational choice of test and allergens to investigate. Patient cohorts and prevalence studies help guide choice for fixed panels

• Aeroallergens are microscopic substances and differ in different geographical regions. Knowledge of aerobiology essential

• Food allergies are very common in GI, skin, airway and anaphylaxis in Kenya at all ages. Tribal differences exist in local diet therefore choice of food allergen to test for varies from individual to individual
<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingestants - Food</td>
<td>Foods (e.g., cows' milk, soya milk, eggs, meat, fish, nuts)</td>
</tr>
<tr>
<td></td>
<td>Food contaminants (e.g., pesticides, antibiotics)</td>
</tr>
<tr>
<td></td>
<td>Food additives (supermarket addicts)</td>
</tr>
<tr>
<td>Inhalants - aeroallergens</td>
<td>Indoor allergens (e.g., mites, moulds, cockroaches, pet dander)</td>
</tr>
<tr>
<td></td>
<td>Outdoor allergens (e.g., pollens, moulds)</td>
</tr>
<tr>
<td>Occupational</td>
<td>Latex, fumes chemicals, isocyanite, dusts, flours, spices mills</td>
</tr>
<tr>
<td>Iatrogenic</td>
<td>Drugs, antiseptics, additives in syrups.</td>
</tr>
<tr>
<td>Others</td>
<td>Stings, cosmetics</td>
</tr>
</tbody>
</table>
SPECIFIC ALLERGY TESTS.

- In Vitro assays in blood samples from serum or cells
- In Vivo tests Skin prick test (SPT) & Intradermal test

THE SKIN PRICK TEST AND SERUM SPECIFIC IgE TEST BOTH IDENTIFY PRESENCE OF SPECIFIC IgE ANTIBODIES TO ALLERGENS i.e. SENSITIZATION. POSITIVE RESULT DOES NOT NECESSARILY CORRELATE TO CLINICAL ALLERGY.

- Gold standard tests for confirmation – In Vivo
  1. Airways- nose, bronchial provocation test
  2. Eyes-conjunctival allergen test
  3. Oral Food Challenge - OFC
Specific Allergy tests- IN VITRO

• Commercial tests using automated equipment perform serological tests for allergen specific IgE detection.

• Patient serum incubated with allergen bound to solid material. Allergen specific IgE is detected using antibodies specific for human IgE labelled with enzyme or fluorescent compound.
• Employ special pediatric, aeroallergen, food panels etc. Panels relevant mainly to European & American markets so of limited value in Kenya. African panels would be ideal but tribal diets (including early life weaning/pregnancy/breast feeding practices) vary significantly, as do urban/rural variances.

• Individual allergens can be tested but very expensive

• Useful in patients whereby SPT cannot be performed, those on antihistamines, widespread skin disease or history of anaphylaxis.

• Newer tests more sensitive and specific than older generation

• IN KENYA CURRENTLY WESTERN FOOD AND AERO PANELS USED
Skin Prick Test (SPT)-In Vivo

• SPT to foods (commercial extracts and fresh fruits/nuts – P2P) based on patients diet, environmental allergens including pets and if relevant, occupational allergens eg latex. Histamine +ve control, saline –ve control. Takes 10-15 mins for wheal and flare result demonstrating SENSITIZATION

• Requires patient to be off antihistamines and other drugs prior to test

• Well tolerated, even amongst children.

• SPT is safe with no reported fatalities in a 5 year American Study.

• Recommendations include all testing facilities be able to deal with potential anaphylaxis
• Test gives visual indication of inflammation/itching mimicking symptoms which assists in compliance of patient’s cooperation in OFC & indoor environmental control measures.

• Can be used to test less common allergens, medications, fresh fruits, vegetables and nuts. Immediate result. Greater flexibility, less costly.

• SPT 70-95% specific and 80-97% sensitive, to inhalant allergies. Lower for food allergens (30-90% specific and 20-60% sensitive depending on allergen eg fresh vs commercial/technique)

• Sensitization to aeroallergens on SPT may precede symptomatic allergy with 30-60% becoming allergic over time.
• The European standards (GA²LEN) concludes that the core diagnostic test for type I immediate allergy, the SPT, should be standardized (procedures and panels) and additional allergens added to this core when indicated.

• Greatest value being the doctor-patient contact to elicit history, demonstrate results and counsel

**Intradermal Test:** more sensitive however less well tolerated as more painful. Allergen extract must be diluted for test, only for aeroallergens. Higher risk of systemic reactions than SPT.
sterile needle

positive test:
area becomes red and swollen

suspected allergen

a number of suspected allergens are tested on the arm at the same time
### Comparison of SPT/Serum specific IgE

<table>
<thead>
<tr>
<th></th>
<th>SPT</th>
<th>Serum Specific IgE</th>
</tr>
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<tbody>
<tr>
<td><strong>Sensitive and have similar diagnostic properties. Some discrepancies exist, one or the other being more sensitive to detect specific allergens because of different proteins or IgE binding sites being represented.</strong></td>
<td><strong>Allergists interpretation &amp; advice recommended for both tests. Results demonstrate SENSITIZATION, not allergy</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Typically used and preferred by allergy specialists</strong></td>
<td><strong>Widespread availability and access by all practitioners</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ability to pick and choose allergens based on history and likely suspects, better flexibility. Choice of test reduces confusion, cross reactive allergens can be selected for test</strong></td>
<td><strong>Fixed panels useful in screening for atopy (eg. distinguishing viral infections from allergic rhinitis). Indiscriminate large panels can cause confusion if many positives</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Cheaper, Instant results, well tolerated including kids. Have to stop some meds prior.</strong></td>
<td><strong>Expensive, especially if individual allergens selected, Results take 1-2 weeks, well tolerated. No need to stop meds</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Operator dependant both for testing and interpretation.</strong></td>
<td><strong>Quality standards needed for in-vitro: calibration, training and experience of technician &amp; use of quality allergens in the solid phase.</strong></td>
<td></td>
</tr>
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</table>
Comparison of diagnostic methods for peanut, egg, and milk allergy - skin prick test (SPT) vs. specific IgE (sIgE)

<table>
<thead>
<tr>
<th>Diagnostic method</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peanut</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sIgE only</td>
<td>75</td>
<td>46</td>
<td>61%</td>
</tr>
<tr>
<td>SPT only</td>
<td>86</td>
<td>67</td>
<td>75%</td>
</tr>
<tr>
<td>sIgE and SPT</td>
<td>88</td>
<td>75</td>
<td>81%</td>
</tr>
<tr>
<td><strong>Egg</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sIgE only</td>
<td>72</td>
<td>43</td>
<td>57%</td>
</tr>
<tr>
<td>SPT only</td>
<td>84</td>
<td>64</td>
<td>74%</td>
</tr>
<tr>
<td>sIgE and SPT</td>
<td>86</td>
<td>72</td>
<td>79%</td>
</tr>
<tr>
<td><strong>Milk</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sIgE only</td>
<td>77</td>
<td>48</td>
<td>64%</td>
</tr>
<tr>
<td>SPT only</td>
<td>85</td>
<td>63</td>
<td>74%</td>
</tr>
<tr>
<td>sIgE and SPT</td>
<td>86</td>
<td>74</td>
<td>79%</td>
</tr>
</tbody>
</table>
Sensitization or Disease?

- Sensitization seen on a test is evidence of memory of specific immune response, from prior exposure to an antigen eg measles Ab, tuberculin test. Not always evidence of active disease process.

- Sensitization can be detected by all sensitive specific IgE antibody tests but their role in disease has to be confirmed by OFC, provocation tests & environmental control measures.

- Positive IgE Sensitization is reported to be a predictor for future disease so monitoring patient & control measures may help progression.
GOLD STANDARD CONFIRMATORY TESTS

• Nasal, conjunctival and bronchial allergen challenges are the Gold Standard for aeroallergens.
  – Investigate allergen-induced early & late phase responses (physiological, cellular and morphological), and to drugs
  – Airway hyper-responsiveness measurements
  – Multiple aerosensitization in local allergic rhinitis
  – Mainly research tool

• Oral Food Challenges are the Gold Standard for dietary allergens
Food Allergy Guidelines – DRACMA, WAO, AAAI, EAACI etc

Diagnosis of Food Allergy “starts with suspicion and ends with an Oral Food Challenge”

DRACMA Guidelines (2010, WAO Special Committee of FA) are the recommended evidence-based management tool for all clinicians for rational decision making.

Guidelines for the Diagnosis and Management of Food Allergy in the United States: Report of the NIAID-Sponsored Expert Panel

Journal of Allergy and Clinical Immunology Volume 126, Issue 6, Supplement, Pages S1–S58, December 2010
• **Oral Food Challenge (OFC)** - gold standard of food allergies. 2 components – short elimination phase followed by systematic rechallenge phase to confirm.

• 3 types using very carefully prepared protocols:
  – DBPCF(C – research tool as impractical and expensive but valuable
  – Single blind OFC – patient blind
  – Open OFC – daycare/office (strict selection/protocol)

• Patient selection very important, must be performed by specialist in appropriate setting.

• Follow up to evaluate the results of OFC & aeroallergen control offers guide future management ie medication and immunotherapy

• Follow up to assess tolerance and re-test prior to reintroducing
OTHER ALLERGY TESTS

- COMPONENT RESOLVED DIAGNOSTICS: Exciting frontier in molecular allergodiagnositics. Serum specific IgE testing to purified native or recombinant allergens. Particularly useful in identifying cross-reactive allergens and allergen families, assessing risk of severity of disease/anaphylaxis, latex and food allergies. Increased accuracy in diagnosis and prognosis.

- Predominantly specialized centres & research tool

- Very expensive

- May play a role in improving specificity of immunotherapy
Egg white (f1)

Gal d1(f233)+Gal d2(f232)+Gal d3(f323)+Gal d4(kk208)

- **Gal d1** – Ovomucoid: heat stable and highly allergenic, risk for reaction to all forms of egg, high levels indicate persistent allergy
- **Gal d2** – Ovalbumin: heat labile, most abundant egg white protein, risk for clinical reaction to raw or slightly heated egg & certain vaccines
- **Gal d4** – Conalbumin: heat labile, adds information on the complete egg sensitization profile, risk of clinical reaction to raw or slightly heated egg
- **Gal d4** – Lysozyme: risk of clinical reaction to raw or slightly heated egg. Lysozyme is used as an additive in certain pharmaceutical products and food

Egg Yolk (f75)

Investigate chicken meat – suggestive of egg-bird syndrome

Egg Yolk (f75)
Milk (f2)

- Bos d4 (f76) - α lactalbumin: risk of reactions to fresh milk, IgE levels fall as tolerance to milk develops, heat labile protein
- Bos d5 (f77) - β lactalbumin: risk of reactions to fresh milk, IgE levels fall as tolerance to milk develops, heat labile protein
- Bos d6 (e204) - BSA: risk for reactions to fresh milk, the main allergen in milk, heat labile protein
- Bos d8 (f78) - Casein: risk for reaction to all forms of milk, high levels are connected with persistent milk allergy, IgE levels fall as tolerance develops, stable to heat
- Bos d lactoferrin (f334) - risk for reactions to fresh milk, heat labile protein
Allergen components as severity markers can be identified with CRD to guide management and prognosis.

<table>
<thead>
<tr>
<th>Food</th>
<th>Allergen Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peanut</td>
<td>Ara h 1,2 and 3</td>
</tr>
<tr>
<td>Soy</td>
<td>Gly m 5 and 6</td>
</tr>
<tr>
<td>Wheat</td>
<td>Omega-5-gliadin</td>
</tr>
<tr>
<td>Milk</td>
<td>Bos d 8 (casein)</td>
</tr>
<tr>
<td>Egg</td>
<td>Gal d 1 (ovomucoid)</td>
</tr>
</tbody>
</table>
• **CAST Cellular Allergen Stimulation Test:** Basophil degranulation test – an in-vitro provocation test. Leukocytes isolated and basophils stimulated and leukotriene released is measured by ELISA assay.

• Useful for pseudo allergens and drugs.

• The sample has to be in heparin or tissue culture medium so as to harvest basophils from patients blood to be exposed to the drug & pseudo-allergens thereby releasing inflammatory substances. The test must be done within 4-6 hours of sample collection.
CAST


Concentration of basophils from the patient’s blood using density gradient centrifugation

Priming of the basophils with interleukin-3 to increase the test sensitivity

Addition of the allergens or native materials to the patient’s cells

Centrifugation, determination of the leukotrienes in the supernatant. A value > 200 pg/ml in relation to the control batch indicates sensitisation type I

The BDT is a laboratory test that can verify or rule out an immediate-type sensitisation in vitro (that is, with no danger to the patient).
• Patch Test: for late phase (T cell mediated) Atopic dermatitis and Contact Dermatitis – delayed hypersensitivity (Type IV hypersensitivity)
• For foods, cosmetics, metals etc
• read after 48h.
Role of tests in Immunotherapy

• These treatments can only be done using the causative allergens. Degree of sensitization is also determined by the lab tests to recommend the formula for the vaccine.

• Currently there are 3 major routes used in Immunotherapy:
  
  1. Subcutaneous immunotherapy-SCIT - where multiple aero-allergens can be mixed in the vaccine so it is suitable for poly-sensitized cases which is common in atopics.
  
  2. Sublingual immunotherapy- SLIT - can only use single aero or food allergens. For food, guidelines yet to be published
  
  3. Oral immunotherapy-has been used in penicillin and cephalosporin desensitization.
Monitoring tests

• SPT and intracutaneous test for IgE tests are useful in starting and monitoring patients on immunotherapy. IgG4 levels are often used in research setting.

• Upon completion of IT regimen or therapeutic food elimination, SPT must be performed before any re-challenge is done.
York, IgG, IgA, hair follicle tests etc are not validated tools and should be avoided as per International/WAO guidance – children have been found to have nutritional deficiencies because of prolonged eliminations based on bogus tests
The Kenyan Perspective

• Based on ISAAC studies, allergic diseases in Kenya mirror the West and increasing in prevalence.
• Some SIGNIFICANT differences noted amongst our patients.
• Food allergy is very common in both adults and children (all manifestations). Up to 30-40% of cases confirmed by OFC in upper and lower airways disease. League table of offending allergens differ from West, likely due to diet, ethnocultural and early life feeding & breastfeeding diets
• Aeroallergy coexists with predominantly indoor allergens (perennial). Sensitization to outdoor allergens but less clinical disease (perennial) seen.
• US studies on African Americans show two-three fold higher sensitizations and multiple sensitizations than White patients – our pattern is similar
Recent serum specific IgE test on 7m old child @ Gerties.

<table>
<thead>
<tr>
<th>Allergen</th>
<th>IU/ML</th>
<th>RAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive control (Control)</td>
<td>0.10</td>
<td>0.3</td>
</tr>
<tr>
<td>Hazelnut (F 17)</td>
<td>0.07</td>
<td>0.2</td>
</tr>
<tr>
<td>Peanut (F 13)</td>
<td>0.04</td>
<td>0.1</td>
</tr>
<tr>
<td>Almond (F 20)</td>
<td>0.04</td>
<td>0.1</td>
</tr>
<tr>
<td>Milk (F 2)</td>
<td>0.02</td>
<td>0.0</td>
</tr>
<tr>
<td>Egg white (F 1)</td>
<td>0.17</td>
<td>0.0</td>
</tr>
<tr>
<td>Egg yolk (F 75)</td>
<td>0.01</td>
<td>0.0</td>
</tr>
<tr>
<td>Casein (F 78)</td>
<td>0.03</td>
<td>0.0</td>
</tr>
<tr>
<td>Gluten (F 79)</td>
<td>0.02</td>
<td>0.0</td>
</tr>
<tr>
<td>Carrot (F 31)</td>
<td>0.05</td>
<td>0.1</td>
</tr>
<tr>
<td>Tomato (F 25)</td>
<td>0.04</td>
<td>0.1</td>
</tr>
<tr>
<td>Cod (F 3)</td>
<td>0.01</td>
<td>0.0</td>
</tr>
<tr>
<td>Crab (F 23)</td>
<td>0.08</td>
<td>0.2</td>
</tr>
<tr>
<td>Orange (F 33)</td>
<td>0.01</td>
<td>0.0</td>
</tr>
<tr>
<td>Apple (F 49)</td>
<td>0.06</td>
<td>0.1</td>
</tr>
<tr>
<td>Wheat flour (F 4)</td>
<td>0.08</td>
<td>0.2</td>
</tr>
<tr>
<td>Rye meal (F 5)</td>
<td>0.12</td>
<td>0.3</td>
</tr>
<tr>
<td>Sesame seed (F 10)</td>
<td>0.04</td>
<td>0.1</td>
</tr>
<tr>
<td>Soya bean (F 14)</td>
<td>0.04</td>
<td>0.1</td>
</tr>
<tr>
<td>Poultry meat mix (FX 25)</td>
<td>0.03</td>
<td>0.0</td>
</tr>
<tr>
<td>Meat Mix (FX 26)</td>
<td>0.00-0.34</td>
<td>0.0-0.9</td>
</tr>
<tr>
<td>1. Not detectable or absent</td>
<td>0.35-0.69</td>
<td>1.0-1.9</td>
</tr>
<tr>
<td>2. Low</td>
<td>0.70-3.49</td>
<td>2.0-2.9</td>
</tr>
<tr>
<td>3. Elevated</td>
<td>3.50-17.49</td>
<td>3.0-3.9</td>
</tr>
<tr>
<td>4. Significantly Elevated</td>
<td>17.50-49.99</td>
<td>4.0-4.9</td>
</tr>
<tr>
<td>5. High</td>
<td>50.0-99.99</td>
<td>5.0-5.9</td>
</tr>
<tr>
<td>6. Very High</td>
<td>&gt;=100.0</td>
<td>6</td>
</tr>
<tr>
<td>7. Extremely high</td>
<td></td>
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**TECHNOLOGIST**

Abi

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In Conclusion

• Choice of test must be well rationalised and clinician able to interpret results.
• In practice, gold standard remains History + SPT, followed by Oral food challenge for dietary allergens
• Careful selection of allergen based on history
• Beware: sensitization and clinical allergy. Also false positives and false negatives
• Equally, a negative result does NOT rule out allergy (remember non-IgE mediated mechanisms etc)
• Identify patients at risk of Allergic March early, test and instate allergen avoidance measures
• Be mindful of prolonged elimination diets without confirmatory tests which can be detrimental to patient
• Look out for self prescribing patients on steroids who need OTHER lab tests eg ACTH suppression tests
• Concurrence of food allergy and asthma reflect high risk of anaphylaxis.
• When asthma/ rhinosinusitis are difficult to control with optimal pharmacotherapy, exclude food allergy.
3y old boy, rhinitis and recent history of recurrent URTIs with chest congestion and wheeze – 2 weekly and developing night time cough. Indoor dog. Strong family history of atopy. What’s the cause???
(SPT Milk 14mm, HDM 6mm, mould 3mm)

THANK YOU! ANY QUESTIONS?
References

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• Guidelines for the Diagnosis and Management of Food Allergy in the United States: Report of the NIAID-Sponsored Expert Panel
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