ALLERGY

(introduction/assessment/investigations/ how to approach a new patient)

Syed Hasan Arshad

Professor and Consultant in Allergy & Clinical Immunology University of Southampton, UK
Director, The David Hide Asthma and Allergy Research Centre, Isle of Wight, UK

The David Hide Asthma and Allergy Research Centre

What is allergy?

- A hypersensitivity reaction to a normally harmless environmental substance ie: allergen

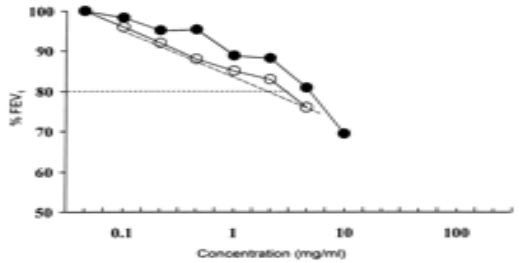
- Symptoms can vary greatly in site affected, nature and intensity

Common Allergic Disorders

- Bronchial Asthma
- Allergic Rhinitis
- Allergy related skin disorders
  - Atopic Dermatitis
  - Contact Dermatitis
  - Urticaria and Angio-oedema
- Food Allergy and Intolerance
- Drug Allergy
- Allergy to Stinging Insects
- Latex Allergy
- Anaphylaxis

How do we investigate allergy?

- Skin prick test
- Prick to prick test
- Specific IgE (RAST/Immunocap)
- Patch test
- Challenges (provocation tests)
  - Drugs
  - Foods
  - Bronchial/nasal/eye

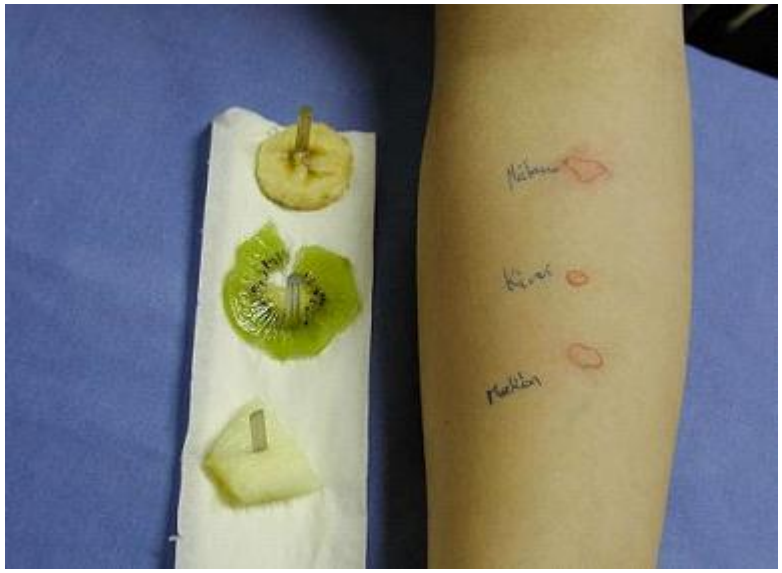


Skin Prick Test

- Inexpensive
- Simple to perform
- Minimally invasive
- Results available in the same setting
- Semi-quantitative
- Safe

Prick to Prick Test

- Used to test for allergy to milk, fruit and vegetables
- Methodology is same as for skin prick test except that instead of commercial extract, actual food is used as allergen source
- The lancet is pricked into the food and the skin of the subject is pricked immediately
- Reaction is observed in 15 minutes



Common Allergens for Skin Prick Test

Aeroallergens

- House dust-mite
- Grass Pollen Mix
- Tree Pollen Mix
- Cat
- Dog
- Horse
- Alternaria
- Cladosporium
- Aspergillus

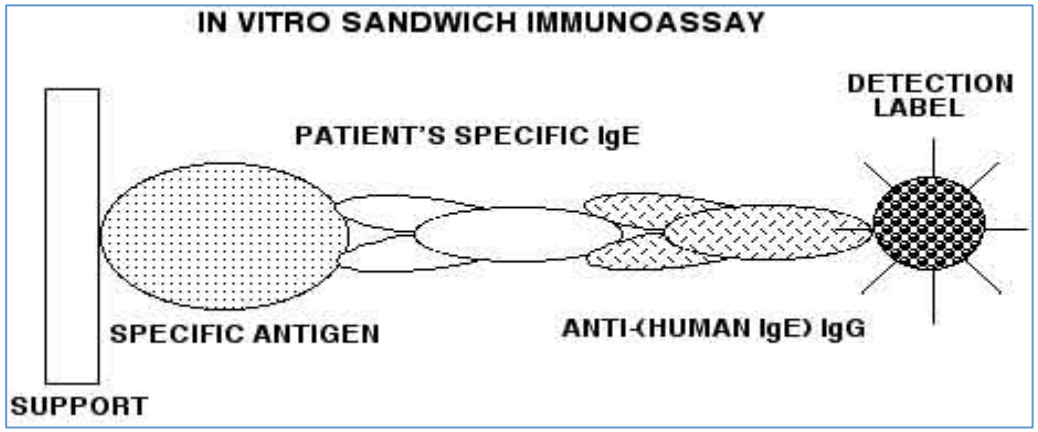
Common Allergens for Skin Prick Test

Food allergens

- Cows' milk
- Egg
- Peanut
- Tree nuts
- Fish (cod)
- Shellfish (prawn)
- Wheat

Measurement of specific IgE

- RAST (Radioallergosorbent test) or ImmunoCap is used to measure IgE antibodies to a specific allergen
- This gives equivalent information to that of skin prick test i.e. if the patient has allergic sensitisation to a specific allergen
- Per test, it is more expensive
- Results are not immediately available; the need for a follow-up visit
- Blood test is less acceptable, specially in children



ISAC test

Trying to find the original cause for allergic reactions can sometimes feel like looking for a needle in a haystack. This is especially true when symptoms and case history are inconsistent, the patient is multi-sensitized or shows unsatisfactory response to the treatment.

This advanced technology enables measurement of IgE antibodies to a fixed panel of 112 components from 51 allergen sources in a single step, using only 30 ul of serum or plasma.

Indications for blood test

Measurement of specific IgE is indicated :

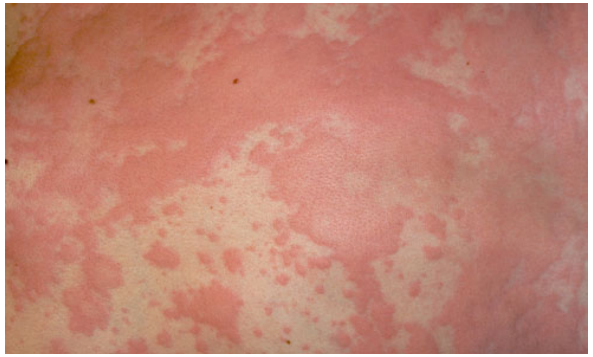
- **Where facilities and/or expertise for skin test are not available**
- **When skin test result is unexpected**
- **In patients with extensive atopic dermatitis**
- **For subjects who can not safely discontinue antihistamine**
- **In patients with extreme sensitivity to food allergens, where there may be a small risk of a systemic reaction**
- **In patients with dermographism**
- **In epidemiological and clinical research**

Allergy tests - interpretation

- ***So what does positive skin test or blood test means?***
  - **Presence of IgE antibodies…… (this means the patient is "sensitised" but it does not mean the patient is "allergic")**
- ***How do we know if the patient is allergic?***
  - ***History***
  - ***Presence and degree of sensitisation (size of skin test or level of IgE antibody)***
  - ***Challenge test***

History

1. *Characteristics symptoms such as rash, angioedema, wheeze, sneeze, nausea, vomiting*



3. *Temporal relationship (approx. 2 hours)*

2. *Typical allergenic triggers such as dust, animal, foods*

Evidence of sensitisation

- ***Presence and degree of sensitisation***
- **Skin prick test or blood test to suspected allergen (from the history)**
- **Semiquantitative test: Larger skin reaction or higher level of specific IgE support allergy as the cause**

Allergy tests - interpretation

- ***Degree of sensitisation***
- ***Larger skin reaction supports clinical reactivity***

- ***Less evidence for level of specific IgE***
- ***Cross-reactivities***

Food	Cross-reactivity	Food	Cross-reactivity
Hen's egg white		Shellfish	
Cow's milk			
Peanuts		Wheat	
Tree nuts		Soybeans	
Sesame seeds		Kiwi	
Fish		Apples, carrots and peaches	

Allergy tests - interpretation

- ***Allergen challenge***
- ***Oral food challenge***
- ***Drug challenge***
- ***Occupational exposure challenge***

Open Challenge Procedure

PEANUT CHALLENGE

Name

AFFIX PATIENT LABEL

IW.No

Please record date and time of entry

Date

Time

FOOD TO BE CHALLENGED:

Dose 1: Rub the lower mucosa of the lip with a peanut (not salted)
10 – 20 minute observation

If no reaction – proceed to:

Dose 2: 1/64 of flapjack to be eaten (250 mg peanut or ¼ peanut)
15 -30 minute observation

Dose 3: 1/32 of a flapjack to be eaten
15 -30 minute observation

Dose 4: 1/16 of a flapjack to be eaten
15 -30 minute observation

Dose 5: 1/8 of a flapjack to be eaten
15 -30 minute observation

Dose 6: ¼ of a flapjack to be eaten
15 -30 minute observation

Dose 7: 1/2 of a flapjack to be eaten
15 -30 minute observation (Patient has consumed 8 g of peanut)

For children over the age of ten:

Dose 8: another flapjack to be eaten at the end of challenge
15 -30 minute observation (Patient has consumed 16 g of peanut)

Record all observations on Food challenge observation c

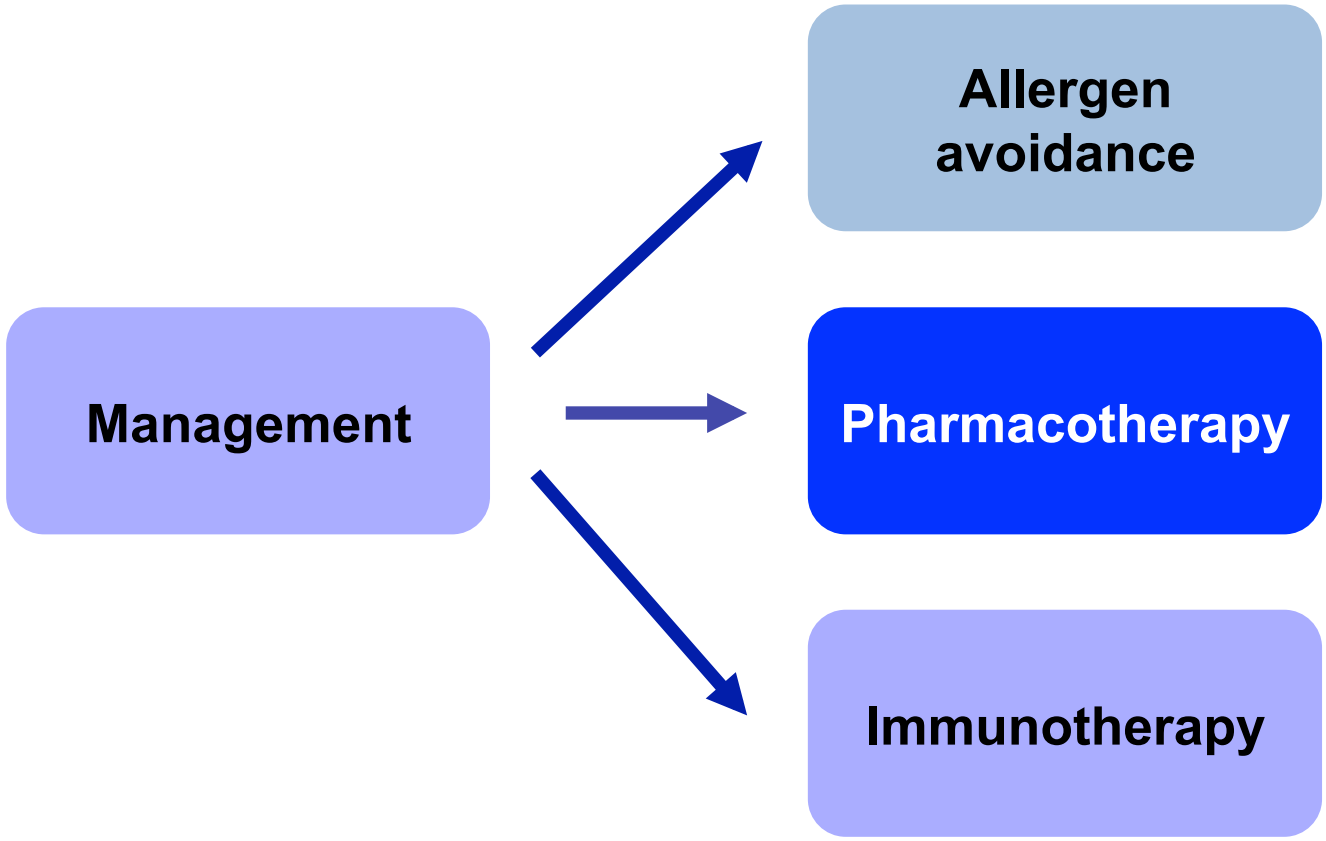
A common misconception

If total IgE is high, the patient must be allergic to something….

Total IgE is not very useful

- ***A high total IgE does not mean patient is necessarily allergic*** (normal rage 0 -200 Ku/L)
  - **Total IgE is high in AD, hyper IgE syndrome, parasitic disease or just non-specific rise in IgE**
- ***A normal total IgE does not exclude allergy***
  - **Patient may be allergic to one or two allergens, enough to cause significant allergic disease**

Management of Allergic Diseases



Allergen avoidance

- **Foods, drugs and latex**
  - **Can be generally avoided**
    - *Avoidance + (occasionally desensitisation)*
- **House dust mite, animals and moulds**
  - **Avoidance difficult but possible to some extent**
    - *Asthma and rhinitis*
    - *Avoidance + Pharmacotherapy + (occasionally desensitisation)*
- **Pollens and insects**
  - **Avoidance nearly impossible**
    - *Pharmacotherapy + desensitisation*

Asthma –related symptoms

- **Where the diagnosis is in doubt (e.g. cough only without wheeze)**
  - **History/spirometry/peak flow variation**
  - **SPT- (allergic asthma/rhinitis-postnasal drip)**
  - **Bronchial hyperresponsiveness**
  - **Full PFT: (other causes/hyperventilation syndrome)**

Asthma/Rhinitis

- **Unexplained deterioration in control (acquired a pet, moved house or job – a new trigger?)**
  - **History**
  - **SPT/RAST: identify cause – allergen avoidance**

Allergic Rhinitis

Severe allergic rhinitis not controlled on standard treatment

- Identify and avoid allergen
- Optimize pharmacotherpay
- Allergen specific Immunotherapy

Urticaria/angioedema

- **Urticaria:** Itchy wheal and flare type reactions, often recurrent.

Angioedema

- **Angioedema**: Swelling of the dermal tissues due to deposition of exudates following vasodilatation.

Urticaria/angioedema

- History indicates an allergic cause is a possibility(possible food or drug related)
- Severe chronic urticaria and angioedema
- Hereditary or acquired angioedema (C1 INH deficiency)

NICE Guidelines

Omalizumab is recommended as an option as add-on therapy for treating severe chronic spontaneous urticaria in adults and young people aged 12 years and over only if:

- the severity of the condition is assessed objectively, for example, using a weekly urticaria activity score of 28 or more
- The person's condition has not responded to standard treatment with H_1-antihistamines and leukotriene receptor antagonists

Urticaria Activity score (UAS)

Urticaria Activity Score		
Daily scoring using the urticaria activity score (UAS)		
Score	Itch Severity	Number of Hives
0	None	None
1	Mild	1-6
2	Moderate	7-12
3	Severe	>12

Step 1:Using the Urticaria Activity score above record the severity of itch and the number of hives 2 times per day (AM AND PM)

Step 2: Add the am and pm daily scores together and divide by 2 to give an average daily score for itch severity and number of hives

Step 3: Add the Average daily scores together to give a value out of 6

Step 4: After 7 days -Add average daily scores from the morning and evening assessments together. Values can range between 0 to 21 for weekly itch severity, and 0 to 21 for weekly hive count. Total weekly score will be out of 42.

	Itch Severity		**Average daily score =** am + pm divided by 2	**Number of hives**		**Average daily score =** am + pm divided by 2	**TOTAL DAILY Average SCORE**
Day of week	**Am**	**Pm**	**Average**	**Am**	**Pm**	**Average**	
Monday	*2*	*3*	*2 + 3 ÷ 2 = 2.5*	*1*	*0*	*0+1 ÷2 =0.5*	*2.5 +0.5 = 3/6*
Tuesday							/6
Wednesday							/6
Thursday							/6
Friday							/6
Saturday							/6
Sunday							/6
TOTAL			/21			/21	/42

Eczema (atopic /contact)

- **Where allergic cause is likely or possible**
  - **Young children (?egg/milk allergic)**
  - **Older children and adults – unexplained deterioration in control**
  - **Severe eczema not controlled with standard treatment**

Drug allergy

- **Where the diagnosis is in doubt**
- **AND**
- **Where alternative medications are not appropriate or without risk**

NICE guidelines for Drug allergy

- If drug allergy is suspected:
- Stop, avoid and document in medical records
- Refer if:
  - NSAID: Use COX-2 inhibitors if reaction mild. Refer who need treatment with an NSAID or had anaphylaxis
  - Beta-lactam antibiotics: Refer if condition can only be treated by a beta-lactam antibiotic or multiple antibiotic allergy
  - Local anaesthetics: if they need a procedure
  - General anaesthesia: if they have had anaphylaxis or severe reaction

Food allergy/intolerance

- **Immediate reaction-food suspected**
- **Immediate reaction-food not suspected**
- **Delayed reactions – gastrointestinal or skin symptoms-food suspected**
- **IBS -? food intolerance**
- **Hyperactivity - ? food intolerance**

Insect allergy

- Immunotherapy should be offered to those with a history of large local or systemic reaction and are at risk of subsequent sting.
- The venom is injected subcutaneously in gradually increasing quantities at weekly intervals, until maintenance dose is reached.
- Thereafter, the injections are given at longer (4 weekly) intervals for 2-5 years.
- The benefit continues after injections are discontinued
- In venom allergy, the evidence of effectiveness is excellent.

Systemic allergic reactions (anaphylaxis)

- **They need to be seen in an allergy clinic (unless the cause is known) to:**
  - **Determine the cause (with history, SPT, RAST, challenges etc.) or classified as idiopathic**
  - **Appropriate preventive measures**
  - **Self injectable adrenalin**

Food allergy - atypical presentation

Case history

- A 40 year old man
- Complained of oral symptoms of itching and swelling with fresh fruits (apple, pears, melon)
- History of hay fever and asthma
- Now concerned about developing food allergy
- No history of a systemic reaction

Food allergy - atypical presentation

- Grass pollen: 6mm x 8mm
- Birch pollen: 10mm x 14mm
- House dust mite: 8mm x 7mm
- Alternaria: -ve
- Cladosporium: -ve
- Aspergillus: -ve
- Cat: 5mm x 6mm
- Dog: -ve

Diagnosis: Oral allergy or pollen fruit syndrome

History is important and gives definite clues

Food allergy - atypical presentation

- Oral allergy syndrome (pollen fruit syndrome):
  - commonest form of cross reactivity where patients allergic to pollens react to fruits, vegetable and nuts causing oral symptom only (oral and throat itching, tingling and swelling).
  - Low risk of anaphylaxis

History is helpful

Case history

- A 14 year old boy
- Eczema during early childhood
- Recently developed intermittent cough and wheeze
- Also reports runny nose on exposure to dust and cat
- Skin prick test positive to house dust mite and cat dander
- Allergen avoidance information provided

History not clear…

Mrs M.S. had her first anaphylaxis soon after a meal in a restaurant. There was no single suspect food

- **Detailed history-food consumed**
- **Plausibility-nuts or shellfish (versus chicken or rice)**
- **Extensive skin testing – (size of skin test/level of specific IgE)**
- **Mrs M.S. had a large reaction to lupin flour**
- **Going back to her, she indicated that the meal had lupin flour. Challenge test was not needed**
- **Diagnosis: Lupin allergy**

History can be deceiving

Case history

- A 45 year old lady
- No previous history of food allergy
- Ate a few almonds late evening
- Within 10 minutes developed redness all over, swelling of the face, urticarial rash, wheeze, throat tightness and difficulty in breathing
- Seen at the local emergency department and treated with adrenalin, antihistamine and steroids
- Given adrenaline autoinjector
- Referred to the allergy clinic

History can be deceiving

Investigations

- **Skin prick test:** negative to a full battery of nuts including almonds
- **Immunocap:** Negative to almonds and mixed nuts
- We proceeded to an oral challenge to almonds (she was not keen!)
- **Oral challenge:** negative!

- Does she have Almond allergy??

- *Does she need AA?*

Questions…..