St George's Healthcare NHS
NHS Trust

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Causes of hyper-reactive responses

- HYPER-REACTIVITY
  - IMMUNOLOGICAL
    - IgE mediated e.g. hayfever
    - Non-IgE mediated e.g. contact dermatitis
  - NON-IMMUNOLOGICAL (Intolerance)
    - Pharmacological e.g. aspirin
    - Enzyme deficiency e.g. milk intolerance
    - Others e.g. migraine

Hypersensitivity

Type I = IgE mediated = ALLERGY

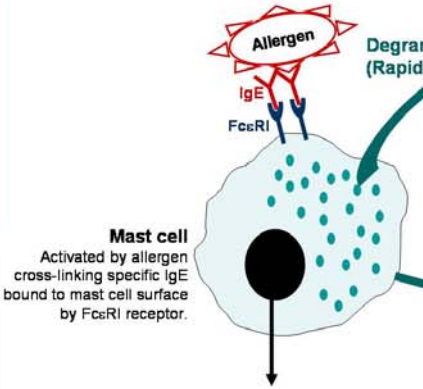
Type II = Antibodies to membrane bound proteins
e.g. Goodpastures disease

Type III = Antibodies to circulating antigens e.g. serum sickness

Type IV = T cell mediated e.g. Type I diabetes, coeliac disease

Type V = Activating antibodies e.g. Graves disease

Immune mediators involved in IgE-mediated allergic responses
IgE, mast cells and eosinophils are also critical for immunity to parasites and worms (helminths).



Allergic rhinitis
(Hayfever)

- Allergy to inhaled allergens
e.g. tree pollen (early spring),
grass pollens (spring-summer),
weed pollen (late summer),
house dust mite (actually the faeces), cat dander (actually the saliva).
- Most common are: house dust mite – reduce with cleaning measures.
cat – remove cat and fur.
grass or tree pollen – topical treatment.
- Assess with peak respiratory flow measurements and **HISTORY**. May not need tests.
- **Oral allergy syndrome** associated with allergy to birch tree pollen.
Patients cross-react with certain fruit allergens e.g. plum, apple, peach, nectarine.
Oral symptoms usually very mild.

ALLERGY

1/3 of UK population have allergy at some point.
Burden to NHS estimated at >1 billion pounds/year.
Clinical history and examination is key.

Anaphylaxis

- A rapid, systemic reaction to an allergen that can cause fainting, shock, cardiovascular collapse, or death.
- Most common allergens are bee or wasp venom, nuts, shellfish, latex.
- Consider route of administration – reactions are more rapid and severe if allergen is given intravenously.
e.g. Drugs such as anaesthetics, radiocontrast and antibiotics can cause anaphylaxis - often administered IV and large volumes.
- Considered in surgery if there is an unexplained drop in blood pressure, or other suggestion of anaphylaxis.
Could be due to various drugs or substances involved in surgery.
- Investigate immediately with tryptase – take time course of serum samples. 0, 1, 3 and 24h recommended, but more is better.
- Tryptase is stable once out of the body, and can be used even in post-mortem investigations.
- If evidence of mast cell degranulation and IgE-mediated anaphylaxis, refer to Allergy Clinic for further investigation of allergy.

Food allergy

- Most common allergens are : milk, egg, wheat, fish, seafood, nuts.
- Can have cross-reactivity e.g. between different nuts or fruit and pollens
e.g. kiwi and latex
e.g. oral allergy syndrome
- Some food allergens are labile i.e. destroyed by cooking e.g. apple, but not all e.g. 70% of egg allergens.
- Children are likely to grow out of milk or egg allergy, but less likely to grow out of nut allergies.
- Some food reactions are **NOT** allergy – could be chemical reaction, intolerance, enzyme deficiency.
e.g. reactions to additives NOT IgE mediated.
e.g. reactions to wheat may be allergy, or coeliac disease (Type IV hypersensitivity).
- CLINICAL HISTORY IS VITAL.

Tests done in Clinic

All done by trained staff with resuscitation equipment present.

Skin prick testing (SPT)

- Break skin through a drop of test allergen
- Visible reaction and quick (approx 30min).
- Can test commercial and non-commercial allergens, with pos (histamine) and neg (saline) controls.
- Only useful for **Type I hypersensitivity**.
- Not useful if have dermatographism or widespread eczema.
- Used with caution and with resuscitation facilities when investigating severe/anaphylactic reactions.

Patch testing

- Apply allergen to a patch of skin
- Useful for **Type IV hypersensitivity**.
- Takes 3-4 days.

Challenge testing

- Controlled and gradual exposure of patient to allergen
- Used with caution and with resuscitation facilities
- Useful to prove reaction – only definitive test.
- Useful to see if have grown out of reaction.

Specific Immunotherapy

- Expose patient to tiny amounts of allergen and slowly increase amount.
- Aims to shift immune response from IgE to IgG4.
- Only available for certain allergens e.g. bee and wasp venom although a rapidly developing field. Studies for grass pollen and for peanut "desensitization" ongoing.
- Requires repeated visits to a specialist clinic, may take years, may not be curative.

Tests done in the Laboratory

Specific IgE

- 100's of allergens available.
- Concentration predicts likelihood of reaction **NOT** severity.
- Only test clinically relevant allergens.
- Useful when skin prick testing is contra-indicated.
- Only useful in context of **clinical history.**

Tryptase

- To investigate suspected anaphylaxis (are mast cells involved?)
- To investigate mastocytosis (baseline tryptase will also be raised).
- Half-life of 2.5h, so timecourse helps interpretation.

Total IgE

- Usually measured with specific IgE.
- High concentration may indicate atopic predisposition
- Not useful for screening for allergy.
- Causes of raised total IgE: Allergy
Parasites
Infection e.g. HIV
Malignancy e.g. lymphoma
Other rare conditions

Comparison of specific IgE and skin prick testing

Skin prick testing	Specific IgE
• Low risk of severe reaction to test.	• No risk of reaction.
• Visual result in approx 30min.	• Sample sent away to lab. Takes 1-2 days.
• Can test with commercial preps or improvise e.g. fresh fruit.	• Can only test with available commercial reagents.
• Needs skilled staff for technique.	• Automated analyser.
• Interpretation is subjective.	• Quantitative results with QC and EQA.
• Requires clear skin.	• Useful if patient has dermographism or eczema.
• Patient must stop anti-histamines.	• Patient can continue anti-histamines.

HIGH STREET TESTING……Bad idea!

There are numerous high street and online kits or testing services. They generally have no scientific basis, are not accredited and results are useless without clinical history, examination, and appropriate interpretation.