Patient

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Hyposensitisation

Synonyms: desensitisation, allergen immunotherapy

What is hyposensitisation?[1]

The mechanism of action of allergen immunotherapy (AIT) is based on inducing immunological tolerance characterised by increased IL-10, TGF-β, and IgG4 levels and Treg cell counts. However, AIT requires prolonged schemes of administration and is sometimes associated with adverse reactions.

The most common allergens administered worldwide

- House dust mite.
- Grass and tree pollen.
- Animal dander (cat or dog).
- Wasp and bee venom.

Indications[2]

- Immunotherapy using allergen vaccines containing house dust mite, animal dander (cat or dog), or grass pollen extract and tree pollen extract can reduce symptoms of asthma and allergic rhinoconjunctivitis.
- Vaccines containing wasp venom extract or bee venom extract may be used to reduce the risk of severe anaphylaxis and systemic reactions in individuals with hypersensitivity to wasp and bee stings.

- An oral preparation of grass pollen extract is licensed for disease-modifying treatment of grass pollen-induced rhinitis and conjunctivitis, and an oral preparation of house dust mite extract is licensed for disease-modifying treatment of house dust mite allergic rhinitis or asthma in certain patients.
- Desensitisation treatment with peanut protein may be offered to patients with peanut allergy in childhood, and treatment can be continued into adulthood.

Those requiring immunotherapy must be referred to a hospital specialist for accurate diagnosis, assessment, and treatment.

Points to note regarding the use of allergen immunotherapy

- There is inadequate evidence of the benefit from desensitisation to other allergens such as house dust, house dust mite, animal danders and foods and these are thus not recommended at present.
- Allergen immunotherapy is not effective in the treatment of atopic dermatitis, urticaria, or headaches and is potentially dangerous if used for food or antibiotic allergies.

Method[3]

- Allergen immunotherapy (also called allergy vaccine therapy) involves the administration of gradually increasing quantities of specific allergens to patients with IgE-mediated conditions until a dose is reached that is effective in reducing disease severity from natural exposure.
- Progressive exposure to the allergen leads to IgG production rather than the IgE production which occurs in type 1 allergic responses.
- **Safe administration of allergen immunotherapy requires the immediate availability of a healthcare professional capable of recognising and treating anaphylaxis, and the presence of cardiopulmonary resuscitation facilities**.
- **An observation period of one hour after injection is mandatory. If the patient develops any symptoms, even if mild, they need to be observed until these completely resolve**.

- One study found that the use of an ultra-short course (four doses) of grass modified allergen tyrosine adsorbate monophosphoryl lipid A (MATA MPLA®) was effective.[4]
- Patients should not be taking beta-adrenergic blocking agents or angiotensin-converting enzyme (ACE) inhibitors when receiving immunotherapy because these drugs may mask early signs and symptoms of anaphylaxis and may make the treatment of anaphylaxis more difficult.[5]

Investigations[6]

Patients need to be referred to a specialist in immunotherapy. Diagnostic skin tests alone are unreliable and should only be used in conjunction with a detailed history of allergen exposure.

Benefits and risks of hyposensitisation

- Hyposensitisation may be effective in allergic rhinitis if sensitisation to a particular allergen can be proven.
- The benefit of hyposensitisation needs to be balanced against the significant risk of anaphylaxis, particularly in patients with asthma.
- An Australian review estimated the risk of mild effects at 1 in 1,500 injections; near-fatal anaphylaxis one per million injections and death at one in 2.5 million injections.[7]

Contra-indications[8]

Desensitising vaccines should be avoided in:

- Uncontrolled or severe asthma.
- Significant co-morbid diseases such as cardiovascular disability.
- Those taking betablockers (may render adrenaline ineffective in hypersensitivity).

Caution and special consideration is also required for:

- Children under 6 years of age.
- Pregnancy.

- Elderly.
- Malignancy, immunodeficiency and autoimmune diseases.

Adverse reactions[9]

These mostly relate to the site of injection - for example:

- Itchiness.
- Swelling.
- Redness.

The risk of systemic reactions with subcutaneous immunotherapy is quite low, but near-fatal and fatal anaphylaxis does occur. Sublingual immunotherapy has a high incidence of local site application reactions, but severe anaphylactic events are very uncommon.

Sublingual allergen administration

There have been a number of studies that have observed the effects of sublingual grass pollen. For example, a randomised, double-blind, placebo-controlled trial testing sublingual grass pollen was associated with a significant decrease in symptoms and reduced the frequency of other treatment usage, eg, steroids.[10] There were no significant adverse events associated with this product.

A preparation called Grazax® to use in immunotherapy for grass pollen allergy is now licensed in the UK.[11] The first dose is usually administered in clinic and can then continue unsupervised.

It is taken for three to four months before the pollen season and therapy should continue (for up to three years). Adverse effects have been described and include oral itching and mild swelling.[12] Other sublingual preparations are undergoing further research in hay fever[13] and food allergies.[14]

One study reported that oral immunotherapy was preferred by patients and improved compliance.[15] Another found significant improvement in quality of life outcomes.[16]

Further reading

- Broide DH; Immunomodulation of allergic disease. Annu Rev Med. 2009;60:279-91.
- Wood RA; Oral Immunotherapy for Food Allergy. J Investig Allergol Clin Immunol. 2017;27(3):151-159. doi: 10.18176/jiaci.0143. Epub 2017 Jan 19.
- Durham SR, Shamji MH; Allergen immunotherapy: past, present and future. Nat Rev Immunol. 2023 May;23(5):317-328. doi: 10.1038/s41577-022-00786-1. Epub 2022 Oct 17.

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