

PEANUT ALLERGY



An assortment of Legumes

Introduction

Peanut and **tree nut** allergy is most commonly seen in infants and young children, but it may also appear for the *first time* in adults.

Peanut allergy often receives greater attention because it is relatively common, exposure is hard to avoid and in some cases even trace amounts can trigger symptoms.

The most common **foods** that can cause life threatening anaphylaxis are:

- **Peanuts**
- Tree nuts
- Shellfish.

It should be noted that **peanuts** actually belong to the **legume** family, and are *different* to true **tree nuts**.

The **proteins** in **peanuts** are very different to those in **tree nuts**.

Therefore someone who is allergic to peanuts is *not necessarily* going to be allergic to tree nuts.

The clinical manifestations of peanut allergy can range from mild and benign to **life-threatening** and **fatal anaphylaxis**.

See also separate documents on:

- **Adrenaline (in drugs folder)**
- **Anaphylaxis (in Allergy folder)**

Epidemiology

Peanut allergy is becoming more common in Australia

Peanut allergy affects around 3% of children under 1 year of age

Food allergy is more common in people who have other allergies such as allergic rhinitis (hay fever), asthma or eczema.

Biology

Taxonomy:

The **peanut** plant, **Arachis hypogaea** is an annual herbaceous plant that grows 30 to 50 cm in height. As a legume, it belongs to the botanical family Fabaceae (also known as Leguminosae, or in common terms, as the bean or pea family).

Its biological taxonomy is as follows:

Kingdom: Plantae

- Angiosperms

Order: Fabales

Family: Fabaceae
Subfamily: Faboideae
Tribe: Dalbergieae
Genus: Arachis
Species: **Arachis Hypogaea**



Arachis hypogaea, (the common peanut). Left: Seed pods. Right: Flower of the *Arachis hypogaea*.



Botany

The exact meaning of the terms **tree nuts**, **seeds** and **legumes** is confusing, particularly for allergic patients (or their carers) trying to decide what foods to avoid.

These terms are not interchangeable and have specific meanings.

In strict **botanical** terms:

- A **legume** is typically a pod with multiple seeds that can open on its own. Seeds are attached to the pods they are contained in.
- A **nut** is typified by a hard outer shell protecting a single seed that does not open on its own. Seed are not attached to the nuts they are contained in.
- A **drupe** (or stone fruit) is an indehiscent fruit with an outer *fleshy* part surrounding a single shell (the pit, stone, or pyrene) containing a seed (kernel) inside.

Peanuts:

Peanuts are legumes

A legume is a plant in the family Fabaceae (or Leguminosae).

Legumes are grown agriculturally, primarily for their **grain seed** called **pulse**

Legumes include:

- Beans
- Chickpeas
- Lupins
- Lentils
- **Peanuts**
- Peas
- Soy Beans
- *Diverse* other plants like wattles and the black bean tree of Queensland.

Grain legumes are cultivated specifically for their seeds. These seeds are used for human and animal food or for the production of oils for industrial uses. Grain legumes include beans, lentils, lupins, peas, and peanuts

Tree Nuts:

A nut is a **fruit** composed of an **inedible hard shell** and a **seed**, which is generally edible.

In general usage, a wide variety of dried seeds are called nuts, but in strict botanical terms “nut” implies that the shell does not open to release the seed (indehiscent).

Tree nuts are **hard-shelled** nuts that come from a wide variety of different botanical families including:

- Almonds (Rosaceae family)
- Brazil nuts (Lecythidaceae family).
- Cashews (Anacardiaceae family).
- Chestnuts
- Hazelnuts
- Macadamia nuts (Proteaceae family).
- Pecans
- Pine nuts
- Pistachios
- Walnuts

Immunology

The substances triggering **IgE mediated** allergic reactions to food are **proteins** in the food.

If a person is allergic to *one* protein present in *one* food (such as peanut) then an allergic reaction can only occur if they eat that *one particular* food.

Some individuals may however be allergic to more than one protein in more than one food and so on this basis may be allergic to several foods.

With few exceptions (e.g. most people allergic to cashew are also allergic to pistachio), it is not possible to *reliably* predict the likelihood of allergy to seed or nut like food without allergy testing to that particular food.

Recent research studies have shown that **early exposure** to **peanut** reduces the risk of peanut allergy developing in high risk infants.

Cross reactivity means that a similar protein is present in a range of different foods. If the same protein is present in several foods, then that person may have allergic reactions to any food containing that protein.

Examples of cross reactivity include people allergic to similar proteins present in hen and duck eggs; cow's and goat's milk; or cashew and pistachio nut.

It is sometimes difficult to predict whether a person will be allergic to one unique protein allergen present in one food only, or several similar cross reactive proteins present in multiple foods, simply based on whether foods have a similar appearance.

Therefore it is not possible to reliably predict the likelihood of allergy to seed or nut like food without allergy testing to that particular food.

Clinical features

The clinical manifestation of peanut allergy can range from mild to life-threatening and fatal anaphylaxis.

Symptoms usually appear within **30 minutes** of ingestion.

Manifestations can include:

1. Urticarial welts
2. Pruritis
3. Angioedema
4. GIT upset
 - Nausea, vomiting, diarrhea
5. Anaphylaxis:

In severe reactions, frank **anaphylaxis** is seen with:

- Bronchospasm
- Hypotension
- Upper airway edema

Cross reactions:

Fortunately, the majority of **peanut allergic** people can eat **other legumes** with safety.

Lupin cross reactive reactions:

- There is some evidence however that those allergic to peanut may be at increased risk of allergy to **lupin**, a bean (and another legume) that is sometimes added to baked goods like bread and sometimes confectionary as a source of protein.

Its use in Australasia is currently less common than in Europe but, its presence is not indicated on food labels in Australasia.

It appears that some people who are allergic to both foods are allergic to the same proteins present in both foods (i.e a **cross reactive response**) whereas others may be allergic to distinctly different proteins in the different foods.

Additional allergies:

- Even though there is little similarity between **peanut allergens** and those present in **tree nuts** (like walnut, almond, pecan, pistachio or cashew), there is nonetheless an increased risk of **other** food allergies in peanut allergic children.

Natural History:

Unlike most allergies to milk or eggs, peanut allergies tend to persist into adulthood. ²

Around 20% of allergies may resolve with age. ¹

Around 20% of allergies may worsen with age. ¹

Investigations

While allergy testing is a useful guide in determining whether the person is allergic or not, it is **not** a reliable guide as to whether reactions will be **mild** or **severe**.

Allergy testing modalities include:

1. FBE:

- This is to look for **eosinophil** counts.

Eosinophils are specialised white blood cells that are designed to kill worms and parasites.

They can also cause tissue inflammation in allergy.

High levels are sometimes seen in blood samples from people with allergic rhinitis (hay fever), asthma and eczema, as well as in a number of less common conditions.

However, a high eosinophil count does **not** prove that symptoms are due to allergy, and a normal eosinophil count does not exclude allergy.

Therefore measuring eosinophil counts have only a *limited* role to play in allergy testing.

2. Allergen specific IgE:

- Blood is taken and tested for **Immunoglobulin E (IgE) antibodies** directed against **specific allergens**. (This test was formerly known as “RAST” - named for the original technology - Radio-Allergo-Sorbent Test that was used to test for IgE antibodies).

These tests are especially useful in situations where when skin testing is problematic such as:

- ♥ Patients with skin conditions such as severe eczema that preclude skin prick testing
- ♥ Patients taking certain medications (such as antihistamines) that can interfere with accurate skin prick testing.

- Measurement of **total IgE antibodies** can also be estimated from a blood sample.

Total IgE may be raised in people with allergies. High total IgE antibody levels are also found in people with parasite infections, eczema and some rare medical conditions.

High IgE levels however do **not** prove that symptoms are due to allergy, and a normal IgE level does **not** exclude allergy. Therefore, measuring **total IgE** levels is not *routinely* recommended in allergy testing.

3. Skin testing:

Skin prick testing:

- **Skin prick** testing has **no value** in the investigation of suspected reactions to aspirin, food additives, or respiratory irritants such as smoke or perfumes.

Scratch testing was used in the past but it is less reliable than skin prick testing, and causes much greater discomfort. Intradermal skin testing may be used to test for allergies to antibiotic drugs or stinging insect venom, when greater sensitivity is needed.

Intradermal testing should **not** be used to test for allergy to inhalants or **foods**.

Skin patch testing:

- **Skin patch** testing is useful to test for allergic contact dermatitis, such as that triggered by metal, cosmetic preservatives or various plants.

Using hypoallergenic tape, commercial standardized allergen paste is applied to a rash-free area of skin, most commonly the individual's back.

The tapes are left in place for 48 hours and kept dry for the entire time.

The test site is then read at different time intervals. An eczema-like rash can indicate sensitivity to a particular allergen.

Skin patch testing is **not** suitable for testing for food allergies.

4. Oral allergen challenge testing:

- Oral allergen challenge testing may sometimes be required to confirm diagnosis when the cause of a **severe** allergic reaction has not been confirmed.

This will normally only be performed using foods or medications under the supervision of an allergy/clinical immunology specialist with appropriate resuscitation facilities immediately available.

Unproven methods:

There are a host of “alternative medicine” methods that *claim* to test for allergy.

These include so-called cytotoxic food testing, kinesiology, Vega testing, electrodermal testing, pulse testing, reflexology, iridology and hair analysis.

They have no scientific basis.

They have not been shown to be reliable or reproducible when subjected to formal study.

These tests have **not been scientifically validated** and may lead to unnecessary, costly and (in the case of some changes in diet) **dangerous** avoidance strategies.

Adverse consequences may arise from unorthodox testing and treatments.

Treatment based on inaccurate, false positive or clinically irrelevant results is not only misleading, but can lead to ineffective and at times expensive treatments, and delay more effective therapy. Sometimes harmful therapy may result, such as unnecessary dietary avoidance and risk of malnutrition, particularly in children.

No Medicare rebate is available in Australia for these tests.

The use of these methods is not recommended.

Management

Prevention:

Avoidance:

- Peanuts are **widely** used in processed Western and Asian foods cooking.

This poses significant problems for people with severe peanut, tree nut or seed allergy and **strict avoidance** is the only certain method of protection.

Omitting peanuts, (as well as tree nuts or seeds) from the diet has no adverse nutritional consequences for most people.

Laws require that any product containing peanut, tree nuts or sesame must be labeled to that effect.

Therefore it is important to check the labels of all foods before purchase.

Restaurants:

♥ **In restaurants the menu descriptions of what is in the food is not always reliable.**

Pesto and dips may have nuts as an ingredient and many salads have nuts or seeds added for texture and sometimes nuts can be added to gravies and sauces. Think of the methods of cooking and possible cross contamination and the likelihood of shared utensils and cookware.

When eating out at a restaurant, ask to talk to the manager about any dishes that should be avoided, and ask them to let the chef know so they can take extra care in preparing the meal, to reduce the risk of cross contamination.

Additionally a cautious **touch test** can be used by placing a small amount of the food on the outer lip before putting it into the mouth. Tell-tale warnings such as a burning, chilli-like reaction, tingling or swelling, will alert to the possibility that a food allergen is present.

Peanut oil:

♥ **Highly purified** peanut oil contains little allergen and refined peanut oils (not cold-pressed) have been shown to be safe in small studies.

Unfortunately, it is difficult to *guarantee* that the oil is *sufficiently* refined to remove all traces of peanut protein, which is the trigger for allergic reactions.

This particularly applies to restaurants which use peanut oils for cooking, as peanut proteins may leach into the oil during cooking, and the oil may be reused a number of times.

In general therefore, avoidance of peanut oil is frequently advised.

When considering the safety of tree nut oils or seeds oils (like sesame), little work has been done in this area to prove safety, so in practical terms, it is often easiest to avoid **nut oils** as well.

Desensitization: Probiotic Therapy:

- A recent study, the **P**robiotic and **P**eanut **O**ral **I**mmuno**t**herapy (PPOIT) Study, suggests an intriguing new method of desensitization to peanut allergy using a “probiotic” bacteria; *Lactobacillus rhamnosus*.

This pilot study showed that combined administration of a probiotic (see **Appendix 1 below**) and peanut oral immunotherapy provided long-term clinical protection against allergic reactions.

The basis of the mechanism for protection is uncertain, but is currently thought to relate to direct immune effects of the probiotic on immunological dendritic cells (unpublished data), that are responsible for processing foreign antigens, for recognition as benign or pathological, (*personal communication, Professor Mimi Tang, RCH, 25 August 2017*).

Treatment:

1. Mild - moderate allergic reactions

These are treated in the usual way with:

- Antihistamines
- Steroids

2. Anaphylaxis:

- Anaphylaxis is treated as per standard protocol.

3. Adrenaline (epinephrine) autoinjector and ASCIA action plan:

For those with **severe** allergy an adrenaline (epinephrine) autoinjector, (such as an “**Epipen**”) should be on hand in addition to an ASCIA Action Plan for the treatment of anaphylaxis

The average nut allergic person will have an accidental exposure every few years, even when they are very careful to avoid the foods to which they are allergic.

The difficulties of avoiding peanuts, tree nuts or seeds *completely* make it essential to have an ASCIA Action Plan for Anaphylaxis when an adrenaline autoinjector has been prescribed.

Appendix 1

Modification of the Microbiota:

Probiotics are live bacteria that, when consumed in sufficient quantities, confer a health benefit to the host.

Prebiotics are nutrients, usually carbohydrates that encourage the growth of probiotic bacteria.

Synbiotics are combinations of prebiotics and probiotics.

Postbiotics consist of extracts from dead or lysed bacteria.



References

1. Peanut, Tree Nut and Seed Allergy. ASCIA 2017.
 - www.allergy.org.au/
2. Long-term clinical and immunological effects of probiotic and peanut oral immunotherapy after treatment cessation: 4-year follow-up of a randomised, double-blind, placebo-controlled trial. (PPOIT Study); Kuang-Chih Hsiao, Anne-Louise Ponsonby, Christine Axelrad, Sigrid Pitkin, Mimi L K Tang, on behalf of the PPOIT Study Team. *Lancet Child Adolesc Health* 2017. Published Online August 15, 2017: [http://dx.doi.org/10.1016/S2352-4642\(17\)30041-X](http://dx.doi.org/10.1016/S2352-4642(17)30041-X) 1

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September 2017.