



SENSE ABOUT SCIENCE
MAKING SENSE OF ALLERGIES

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Contributors' disclosure of interests are available online

www.senseaboutscience.org/pages/making-sense-of-allergies.html

INTRODUCTION

Making Sense of Allergies

	Rash on face	views: 2,100
	Anyone else have an unknown food allergy?	views: 7,800
	Allergies and sinus issues are ruining my life.	views: 2,700
	Does anyone else have colophony allergy?	views: 16,300
	Bandaid allergic reactions	views: 150,000



A

llergy is

one of the most frequent subjects in newspapers, magazines and online forums.

There are 100 million allergy-related Google searches a year and hundreds of Facebook pages dedicated to the subject. On just one parent internet forum there have been over 10,000 posts about allergy. The Anaphylaxis Campaign receives 20,000 enquiries a year, mostly on food allergy. In the last year, Allergy UK has had 2.6 million visits to its website about all types of allergy.

Allergies are frustrating, restrictive and sometimes frightening conditions and they seem to be rising at an astonishing rate in developed countries. Seven times as many people were admitted to hospital with severe allergic reactions in Europe in 2015 than in 2005¹. In the 20 years to 2012 there was a 615% increase in hospital admissions for anaphylaxis in the UK², and the percentage of children diagnosed with allergic rhinitis and eczema have both trebled over the last 30 years³.

It's little wonder so many people are seeking answers. But answers are difficult to find amid the noise. Theories about allergy – some from medical research and some from lifestyle 'gurus' – have led to conflicting ideas about whether allergens should be avoided or homes are too hygienic. Shops, clinics and websites sell allergy tests that don't work. Allergies are difficult to diagnose and share their symptoms with many other conditions. According to practitioners, far more people think they have an allergy than actually do, which might be why people coping with dangerous allergies complain that waiters think they're just fussy or nursery staff don't take their child's allergy seriously. Are the numbers being swelled by the 'worried well'? Has allergy become a catch-all self-diagnosis that might be masking other problems or anxieties about modern life?

We have investigated ideas about the causes, diagnosis and treatment with a group of allergy specialists and have brought together points that we hope will help make more sense of it all in the following pages.

¹ Nwaru BI et al. (2014) *Allergy* 69:992-1007

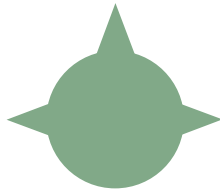
² Turner PJ et al. (2015) *Journal of Allergy and Clinical Immunology* 135:956

³ Gupta R et al. (2007) *Thorax* 162:91-96

CONTENTS

01. WHAT AN ALLERGY IS – AND ISN'T

Allergies are overreactions of the immune system in response to something that is normally harmless. Different allergies are distinct conditions, which have different triggers, symptoms – from mild to life-threatening - and treatments, and occur at different rates in the population. Some allergies have similar symptoms to other conditions. Food intolerances, which can be unpleasant but don't pose the same threats, are often confused with food allergies, which are less common and potentially dangerous. Some people with asthma, eczema and rhinitis are allergic, while others are not.



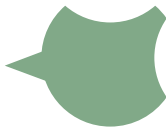
02. IS THIS AN ALLERGY THEN?

There isn't one test to diagnose all allergies. Accurate diagnosis requires both a test and a medical consultation. Many allergy tests sold on the high street and online have no scientific basis and do not work, giving incorrect results that stop people getting the right treatment.



03. WHY DO WE GET ALLERGIES?

Some allergies have been studied more than others. Researchers are still trying to understand what causes allergies, and why rates of allergy are rising. The theory that our lower exposure to microorganisms is responsible for how we react to allergens has been studied extensively. Researchers now believe that a whole range of environmental and lifestyle factors have acted together to reduce our exposure to a range of microbes which prevent the immune system from overreacting to harmless substances. Other factors, including genetic predisposition are also important.



04. ALLERGY MYTHS

Outdated information, lifestyle guru theories, people promoting alternative diet books and products, internet rumours, distorted news reports about research, common misunderstandings...we take a look at some of the enduring ones.

05. MORE INFORMATION AND SOURCES

01

WHAT AN ALLERGY IS — AND ISN'T

“SCIENTISTS SNIFFING OUT THE WESTERN ALLERGY EPIDEMIC”

“REVERSING THE ALLERGY EPIDEMIC: ‘LET THEM EAT DIRT’ AND MAYBE PEANUTS TOO”

“I HAD AN ASTHMA ATTACK BECAUSE OF A SLICE OF LEMON: FOOD ALLERGY EPIDEMIC THAT EXPERTS FEAR MAY BE CAUSED BY POLLEN AND MODERN DIET”

“DIRTY BEDROOMS ARE TRIGGERING AN ALLERGY EPIDEMIC – BECAUSE 20% OF BRITONS ONLY CHANGE THEIR BEDDING ONCE A MONTH”

Allergy describes a wide range of conditions, some of which are rare and some very common. About 25% of people in the UK have hay fever⁴ whereas 1-2% of adults have diagnosed food allergies⁵. Reports that allergies have reached epidemic levels oversimplify the situation, but allergy is now the most common chronic disease in childhood.

If allergy is common, so are confusions about what is and isn't an allergy. Food intolerances and some difficult-to-diagnose conditions are easy to confuse with allergies. Self-diagnosis is common, including both people who don't have an allergy but think they do and people who have had an allergic reaction but blame the wrong cause. A study of 969 children on the Isle of Wight found 34% of parents reported food allergies in their children but only 5% were found to have an allergy⁶. There is also over diagnosis caused by doctors relying on or misinterpreting limited tests⁷.

This all means that many people get worried about something unnecessarily, take the wrong treatments or avoid the wrong thing. Fears about food allergies are leading parents to cut major food groups from their children's menus and causing people to follow

⁴ Pawankar et al. World Health Organization. White Book on Allergy 2011-2012 Executive Summary




⁵ Chapter 4, The Extent of Burden of Allergy in the United Kingdom. House of Lords – Science and Technology 6th report 24.07.2007

⁶ Venter C et al. (2008) Allergy 63:354-359

⁷ Fleischer DM et al. (2011) The Journal of Pediatrics 158:578-583

unnecessarily restrictive diets. It may seem surprising in advanced societies but these are leading to cases of malnutrition⁸, which is particularly risky for children.

The rise in allergies has prompted some people to become dismissive. However, allergies are an overreaction of the immune system which can have serious consequences if an allergic person is exposed to the allergen or if they don't take their medication.

	Topics	Replies	Views
	" I wish the author had pointed out how people falsely (or delusionally) claiming allergies results in those in real danger being taken less seriously. "	824	1984
	" I knew a kid who died from one bite of a peanut butter cookie - he didn't even swallow it. This is serious stuff. On the other hand, I know dozens of people who claim to be "severely allergic" to things that they have previously consumed every day for their entire lives. "	911	1781
	" I was diagnosed with a wheat allergy (by a board certified allergist) about 2 years ago. Thankfully, my reactions were always very mild. Though, I catch myself pointing out the diagnosis when people talk about how they're "going gluten free. " I can't help but try to avoid being lumped with them. "	251	824
	" When I served, I'd often return to a customer after checking the ingredients on a dish that they ordered, and inform them that unfortunately the sauce contained an allergen. Sometimes they would pick another dish, but sometimes they'd say "oh it's not that severe" or "well actually I just really don't like ____". I hate to think that these sorts of people are desensitizing others in the food industry to the actual risk of allergic reaction. "	421	914

⁸ Isolauri E et al. (1998) *The Journal of Pediatrics* 132:1004-1009

BODY DEFENCE GONE WRONG

The human body has many methods to handle threats. Some are general and have nothing to do with the physical, chemical or biological nature of the threat. For example, we blink when something comes too close to our eyes, no matter what it is. We sneeze in dusty atmospheres and cough and splutter in smoke, regardless of what substances are in that dust or smoke. These reactions do not involve our immune system.

The immune system only gets involved when our bodies register a *particular* substance as a threat. White blood cells (part of the immune system) produce molecules called antibodies in response to each identified threat, such as a virus or type of bacteria. This is known as sensitisation. It is part of the normal immune system response. The next time the threat appears, the antibodies cause cells to release inflammatory substances, which prompt the body to fight it off. There are five types of antibodies:

- IgA protect body surfaces that are exposed to outside foreign substances, such as the nose, breathing passages, digestive tract, ears, eyes and blood.
- IgG are found in all body fluids.
- IgM are found in blood and lymph fluid.
- IgE are found in the lungs, skin, and mucous membranes. They cause the body to react against foreign substances such as parasitic worms, house dust mites and animal dander (skin flakes) which give rise to allergies. They are also responsible for allergic reactions to food and some medicines.
- IgD antibodies are found in trace amounts in the blood.

Allergies occur when someone's body treats a harmless substance (called an allergen) as a threat and the immune system produces an unnecessary response to it.⁹ The first step of developing an allergy is when sensitisation occurs because the immune system mistakenly produces specific antibodies against an allergen.

These antibodies bind to a type of white blood cell called a mast cell. The next time a sensitised individual comes across this allergen, their body 'remembers' and the mast cells with the specific antibodies attached release the inflammatory substances, such as histamines. These substances, whose normal role is to fight off infection, cause the symptoms of an allergic reaction (eg sneezing, itching).

Researchers don't know how many sensitised people will develop an allergy. Studies looking at this question have investigated how many sensitised children go on to develop peanut allergy but they have come up with wildly different rates of 11% and 65%.¹⁰

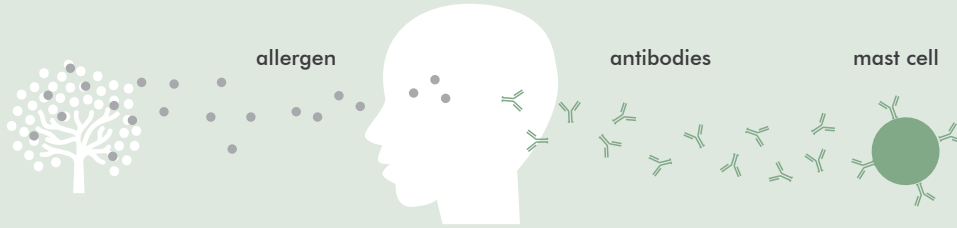
⁹ Johansson SGO et al. (2003) *Journal of Allergy and Clinical Immunology* 113:832-836

¹⁰ Hourihane J (2006) *The prevalence of peanut allergy in British children at school entry age in 2003. Food Standards Agency Report.*

HOW ALLERGIES MAKE US SNEEZE AND WHEEZE

In IgE-mediated allergic reactions

Priming exposure to allergen: sensitisation



1. When an allergy-prone person is exposed to an allergen, eg pollen, their body may produce IgE antibodies to that allergen.

2. These antibodies attach to a type of white blood cell called mast cells. This is known as sensitisation.

Next exposure to allergen: allergic reaction



3. The next time the sensitised person is exposed to the same allergen, the mast cells recognise the allergen via the IgE antibodies and release chemicals, such as histamine into the tissues. The chemicals irritate the body and cause allergic symptoms.

Allergic reactions can be grouped into two classes. The most common and best understood by researchers is described above: it involves IgE antibodies and is known as IgE-mediated allergic reaction. Symptoms usually develop within 15 minutes of being exposed to the allergen. Other reactions are known as non-IgE mediated and typically cause symptoms to appear more slowly, sometimes several hours after exposure. These reactions do not necessarily involve antibodies but instead, cell reactions of the immune system. They are much less common and are generally less well understood.

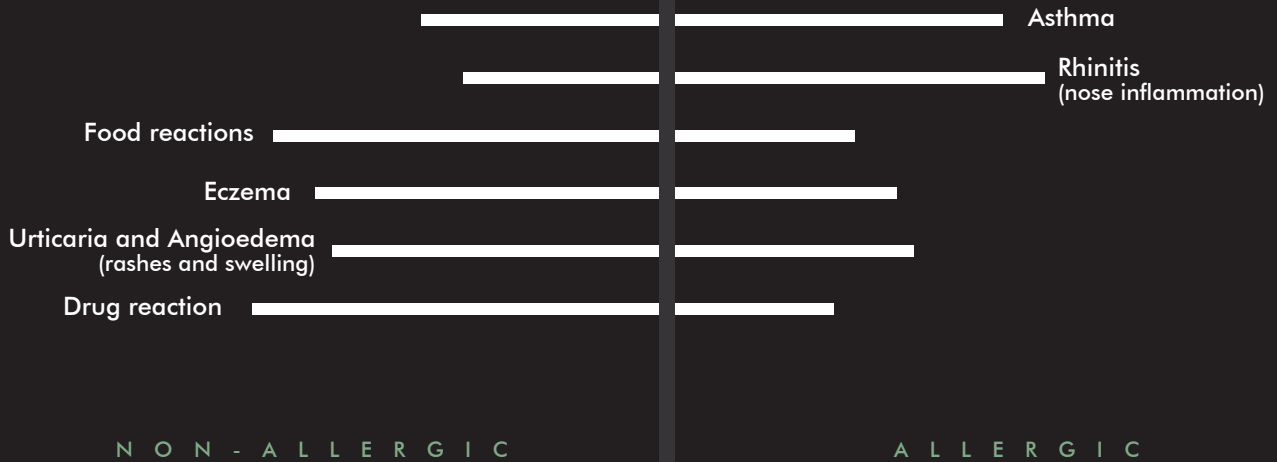
The type of symptoms depend mainly on how the person is exposed to the allergen because symptoms usually occur where the allergen comes into contact with the body. For example, allergens that are eaten can cause rashes and itching and swelling of the mouth and tongue. Exposure to airborne allergens can cause nasal and eye symptoms, and airway

symptoms such as sneezing and wheezing. Beyond that, the symptoms caused by allergic reactions can't easily be predicted. Different types of reaction can cause the same symptoms. The same type of reaction can cause different symptoms in different people and even different symptoms in the same person every time it occurs, so an egg allergy can cause a swollen itchy rash on one occasion and vomiting on the next.

To complicate things further, symptoms of allergic reaction are the same as the symptoms of some non-allergic conditions. For example asthma and eczema are not always due to allergies so proper diagnosis of their cause is vital to get the right treatment.

Allergy can be a component of these conditions, but they can also occur without allergy.

**THESE CONDITIONS CAN BE ALLERGIC AND NON-ALLERGIC,
HERE ARE THE ESTIMATED PROPORTIONS OF EACH:**



The severity of symptoms depends on how much allergen the person was exposed to as well as factors such as exercise, how tired and stressed the person is and how much alcohol they have drunk. This makes it almost impossible to predict when a severe reaction will happen but some circumstances point to a greater risk: having asthma or if you have had a severe reaction in the past.¹¹



Samantha Walker
Director of Research & Policy,
Asthma UK

“For children with food allergies and asthma it is even more vital to keep the asthma well controlled.”

GROWING OUT OF IT

Allergies can come on at any age, and can also be outgrown. Different allergies show different patterns, for example we know children born with an inherited allergic tendency (called atopy) often first develop

eczema in infancy, which is closely linked to the development of food allergy. Many food allergies are outgrown in childhood, for example, egg allergy, but this is often followed by the development of hay fever or asthma in later childhood. However, other allergies such as nut allergy are usually lifelong. Why some people outgrow some allergies is not known, but if we could fully understand the process it may help us develop cures.

ANAPHYLAXIS

Some people will experience severe allergic symptoms involving the entire body. This is called anaphylaxis or anaphylactic shock and it can be life-threatening because it causes breathing difficulty and/or low blood pressure. Anaphylaxis usually develops within minutes of contact with an allergen, but on rare occasions can be up to four hours later. It can follow both IgE and non-IgE mediated allergic reactions, but is much more common in IgE-mediated (and when it's non-IgE mediated it's actually called an anaphylactoid reaction).

¹¹ Arshad SH (2014) *Journal of Allergy and Clinical Immunology* 134:1462-1463

Doctors don't know why some allergic people experience anaphylaxis and others never do. However, researchers have observed that it is more likely to happen to children with food allergies including to peanuts and tree nuts and adults who are allergic to bee stings and medication. Anyone who has had an anaphylactic shock before is at higher risk of experiencing it again.

DRUG ALLERGIES

Drug allergies are immune reactions to medicines. The drugs that most commonly cause allergic reactions are antibiotics (especially penicillin and cephalosporins), muscle relaxants given during general anaesthesia and certain painkillers including aspirin and ibuprofen. It is essential to correctly distinguish drug allergies from predictable side effects because an allergy diagnosis limits the number of effective drugs available to a patient.

But sensitisation doesn't always happen first...

The exception is something called cross-reactive allergy. Sometimes people who are allergic to one allergen are also allergic to others without ever having been exposed to them and sensitised before. Around half of all people with a latex allergy also react to avocado, banana, chestnut, kiwifruit, passion fruit, plum, strawberry and/or tomato, for example. There are proteins in these foods that are a similar shape to proteins in latex so antibodies for latex also react to these foods and cause the same immune response. It's not that the person has more than one allergy; they have a single allergy triggered by different things.

Cross-reactive allergies vary a lot between patients as to how many different allergens prompt the allergic reaction and how severe it is. Only a proportion of allergy sufferers have cross-reactive allergies and researchers are still investigating why that is.

**If you
are
allergic
to...**

**You may
also be
have a
reaction to...**

**Birch
pollen**

Kiwifruit, apples, pears, peaches, plums, coriander, fennel, parsley, celery, cherries, carrots, hazelnuts and/or almonds.

**Grass
pollen**

Peaches, celery, tomatoes, melons, and/or oranges.

**Natural
rubber
latex**

Bananas, avocados, kiwifruit, chestnut, and/or papaya.

Modified from Asthma and Allergy Foundation of America
<http://www.aafa.org/display.cfm?id=9&sub=20&cont=728>



Tariq El-Shanawany
Consultant Clinical
Immunologist

“Advice about cross-reactivity needs to be tailored to the patient. However, you shouldn't automatically avoid a food because some people with your allergy cross-react to it; you should only stop eating a food if you have symptoms.”

FOOD ALLERGY OR FOOD INTOLERANCE

“INTOLERANCE TO FOOD FUELS
£360M SALES BOOM”

“WORRIED WELL: HALF OF SHOPPERS
NOW BUY 'FREE FROM' PRODUCE
FOR FOOD INTOLERANCE”

Intolerances to foods can cause problems such as bloating, stomach cramps, vomiting, diarrhoea and fatigue. Symptoms usually occur several hours after eating. Food intolerances are not allergies because they do not involve the immune system, but can be mistaken or self-diagnosed as allergies. People with intolerances can usually eat small amounts of the foods to which they are intolerant. In contrast, allergic reactions to foods usually occur quickly and can be life-threatening. People with allergies to foods usually react to small amounts of the food.



Rubaiyat Haque
Consultant Allergist

“Many patients think they have food allergies when in fact they may be intolerant.”

Some of the most common food intolerances are well understood. For example, lactose intolerance is caused by the fact that some people don't have specific enzymes called lactases to digest it. Others intolerances are known to be adverse reactions to naturally occurring substances in food such as histamines or caffeine.

In the future we may discover some intolerances do involve the immune system, in which case they will be reclassified as allergies. For example, one component of cow's milk intolerance is now recognised as a non-IgE allergy.

But for many food intolerances the mechanism is just not known. So in the main, food intolerances are difficult to diagnose.



Tariq El-Shanawany
Consultant Clinical
Immunologist

“The distinction between allergies and intolerance is important because it changes the advice given. Unfortunately food allergies and intolerances are often confused, which can result in risky behaviour if you have a severe allergy, and needlessly strict avoidance if you have an intolerance.”

COELIAC DISEASE

Coeliac disease is often confused with wheat allergy and with gluten intolerance, but it is actually neither. It is an autoimmune disease where the body attacks its own cells. Eating gluten, a protein in wheat, rye and barley, causes the body to destroy and damage the lining of the small intestine.

ARE ALLERGIES REALLY BECOMING MORE COMMON?



Rubaiyat Haque
Consultant Allergist

“We've seen increases in allergic disease over a short period of time: for example, a study on the Isle of Wight found that between 1989 and 2001 rates of asthma increased from 8% to 21%, hay fever from 15% to 25% and allergic eczema from 12% to 24%.”

The proportion of people with allergies is increasing (except for allergic asthma where rates have plateaued)¹². This pattern is seen in the western and the developing world although it's still the case that a much lower proportion of people in the developing world have allergies. Increases in wealth and standards of living are linked to increases in allergies and some of the rising numbers may be due to people moving to cities, which changes their exposures to allergens and to other things that calibrate their immune responses.

In both western and developing countries, some of this increase is due to increased diagnosis as more people become aware of allergies, so problems that would previously have gone undiagnosed are now caught and treated. Diagnosing an allergy early is good as it means the correct treatment can be given which reduces the severity of allergic reactions and protects against exacerbation of other allergic health problems such as asthma.

But if the increasing numbers of people who have allergies include a lot of over diagnosis and self-diagnosis, then there are also a lot of people treating allergies unnecessarily. This also makes it harder to improve our understanding of what is causing the real rise.

HOW ARE WE RESPONDING TO ALLERGIES AND HOW SHOULD WE?

“EU ALLERGY RULE TO COST RESTAURANTS £200 MILLION”

“WHY HAS TESCO GONE SO NUTS ABOUT ALLERGIES?”

There is a burgeoning market in foods that are 'free from' some allergens, notably gluten,

wheat and dairy, to cater for the rise in people with allergies. This is welcomed by people who really do have allergies.



Moira Austin

Helpline & Information Manager,
Anaphylaxis Campaign

“Greater understanding of allergies is hugely important in restaurants. There are bad habits such as waiting staff ‘scraping off’ allergenic foods from a plate if the customer says they are allergic to one of the ingredients in the mistaken belief that this will effectively remove the allergen, which it doesn’t. This needs to be stamped out.”

However, food producers and supermarkets also label items with “may contain traces of...” even though they are highly unlikely to contain any of the allergen. EU regulations now make suppliers label 14 common allergens¹³ (which account for 90% of food allergies). However, some commentators believe the ‘may contain’ labels are protection from legal action, rather than useful to people with allergies, and limit the diets of those with food allergies even more. Researchers are working to better understand what levels of exposure cause allergic reactions (thresholds), so that labelling can be more useful by highlighting genuine risks.



Moira Austin

Helpline & Information Manager,
Anaphylaxis Campaign

“Until we have reliable threshold levels for food allergens, we have to continue with over-labelling, which is restrictive but probably better than under-labelling and causing a severe allergic reaction.”

¹² Gupta R et al. (2007) *Thorax* 62:91-96

¹³ Food Standards Agency: *New allergen rules* www.food.gov.uk/news-updates/campaigns/allergen-rules [last accessed May 2015]

02

IS THIS AN ALLERGY THEN?

“CHILDREN WRONGLY LABELLED ALLERGIC BY TESTS SOLD ONLINE”

“THE GREAT ALLERGY DELUSION: MILLIONS ARE TOLD THEY’VE AN ALLERGY...”

“TELLING FOOD ALLERGIES FROM FALSE ALARMS”

Allergy is common, but it is also commonly misdiagnosed and inappropriately treated. Increased discussion and conversations about allergies and the rise of ‘free from’ products are making people wonder if allergies could be the cause of some health complaint they or their children have. This kind of wondering aloud accounts for many of the online posts about allergy in discussion forums. There is such a lot still unknown about allergies, and because even the best allergy tests cannot give an answer that is 100% certain, a space has opened up for companies to offer all kinds of unverified tests and treatments as solutions.



Samantha Walker
Director of Research & Policy,
Asthma UK

“Approximately 30% of the population have an allergy, but many more suffer with non-specific symptoms that are not related to their immune system. Whatever the underlying cause, patients want their symptoms to be taken seriously: trivialisation of their condition may turn them towards non-validated tests of dubious value and high cost.”

WHAT IS NEEDED FOR AN ACCURATE DIAGNOSIS OF AN ALLERGY?

1. A record of response to the allergen

This means the patient has a clear story that they experienced symptoms soon after being exposed to the potential allergen. This will be reviewed in a consultation with a doctor. If there is uncertainty, it is helpful to have a written record (eg in a food diary) of consistently experiencing symptoms after the same food.

2. Skin prick or blood test (for IgE-mediated allergy)

The next step is to conduct either a specific IgE blood test to measure the presence of antibodies to the allergen in the blood, or a skin prick test to detect the levels of IgE antibodies in the skin. Skin prick tests place a drop of solution containing an allergen on the skin, usually on the forearm, then prick the skin through the drop. Up to 25 allergens can be tested for at once in separate drops. Swelling should occur around the site of the skin prick if the patient is sensitive to the allergen. The two tests (blood tests and skin prick tests) are similarly reliable so which one(s) are done mainly depends on the local services.

A positive result from one of these tests, along with a documented history of symptoms in response to the allergen, is often enough to diagnose an allergy.

Most doctors would rule out an allergy if a person doesn't have a documented record of response to an allergen and where skin prick or IgE blood tests were negative.



Maxine Phelops
Paediatric Pharmacist

“Anti-histamines such as cetirizine and loratidine if not avoided for two days before a skin prick test can lead to inaccurate results, as the anti-histamine will suppress any histamine-based allergic reaction. Chlorphenamine a longer acting antihistamine should be avoided for five days.”



Maureen Jenkins
Clinical Director Allergy UK

“A positive specific-IgE test does not always mean you are allergic to that substance, only that you have a higher level of that specific-IgE antibody”



Tariq El-Shanawany
Consultant Clinical Immunologist

“Even if you have a positive skin prick or blood test result, if you're eating something and tolerating it, don't stop.”

3. Allergen challenge test

These are rarely performed if an allergy was confirmed or ruled out during steps 1 or 2. Allergen challenge tests are the most accurate way to diagnose an allergy, but they are also the riskiest tests and take a lot of resources to do. The patient is exposed to small and then increasing amounts of the suspected allergen under medical supervision to see if allergic symptoms develop. They are used if there is doubt after 1 and 2, or when reintroduction of an allergen is being considered.

ALLERGY TESTS

There is no one allergy test that can alone diagnose an allergy. Each of the diagnostic stages above need to be carried out under the care of a medical professional in conjunction with a face-to-face consultation because results from the tests must be considered in the context of the patient's medical history. A positive result from an IgE test isn't definitive; the body can generate IgE in response to an allergen (sensitisation) without having an allergic reaction to it. No test is 100% accurate. For example 40%–80% of positive IgE results for peanuts occur where no allergy exists.¹⁴ There are a lot of false positive tests, which in practice means that there are lot of people walking round who if tested would have a positive test result but who get absolutely no symptoms on exposure to an allergen. We do not yet understand why some people with positive tests do get symptoms, and why some people don't.

However, skin prick, blood IgE and allergen challenge tests are the only clinically valid tests available because they test a direct

¹⁴ Pharmacy Allergy Testing and Diagnosis – the BSACI view. British Society for Allergy and Clinical Immunology www.bsaci.org/Guidelines/PharmacytestinganddiagnosisistheBSACIview.pdf [Last accessed May 2015]

response to an allergen or test part of the immune system that is involved in allergic reactions. Numerous tests claiming to diagnose allergies can be found on the high street and online. There is no evidence that any of these can accurately and reliably diagnose allergies:

- **Applied kinesiology** looks for muscle weakness after test substances are placed in the patient's mouth or hands. Muscle weakness has no relationship to whether the patient is allergic to the substance. In fact, results of kinesiology tests are heavily influenced by the tester.
- **Cytotoxic tests (ALCAT, FACT, Bryan's test)** expose a person's blood sample to test substances. The reaction of the white blood cells is observed. But the reaction of blood cells is the same in people with and without allergies.
- **Food-specific IgG testing (food intolerance test, YorkTest, Hemocode)** looks for specific IgG antibodies against food stuffs in the blood. IgG antibodies are part of the immune system with a key role in fighting infections but the best medical evidence has shown elevated IgG levels do not suggest an allergy. Results are frequently positive in individuals who do not have an allergy or a food intolerance.
- **Hair testing** in most cases uses electro-acupuncture to look at the electromagnetic resonance of a lock of hair. Hair is not involved in allergic reactions so testing hair samples cannot provide any useful information on allergic status.
- **Nambudripad's Allergy Elimination Techniques (NAET)** is based on the idea that allergies are caused by 'energy blockage' and can be diagnosed by muscle testing and cured by acupuncture. There is no credible evidence that this technique can diagnose or treat allergy.
- **Vega test** combines acupuncture and homeopathy theory and measures electronic resistance across the skin at various points. The measurements have no relation to allergic status and the test cannot distinguish between people who have an allergy and those who don't.



Paul Seddon
Consultant Paediatric Allergist

"These dubious tests, like IgG tests and the hair test, lead consumers and patients to believe they are getting an accurate diagnosis of their allergies. The NHS Choices website says these tests are 'less reliable' – but in fact they are worthless.

Invalid tests come with a high risk that you will be recommended inappropriate or potentially harmful treatments. I commonly see children who've been put onto unnecessarily restricted diets because their parents assume, in good faith, that they have allergies to multiple foods on the basis of 'allergy tests' which have no scientific basis."



Tariq El-Shanawany
Consultant Clinical Immunologist

"It might feel reassuring to get a quick result from a test you have found online, but if it's misleading it's a waste of time."

The National Institute for Health and Care Excellence (NICE) maintains a list of tests that should not be used for diagnosing allergies.¹⁵

ALLERGY TREATMENTS

Avoiding the allergen is the most effective way to avoid an allergic reaction. Of course, this can be difficult. If hay fever sufferers keep windows closed and avoid drying washing outside, they may be able to reduce but not escape altogether wind-blown pollen during certain times of the year.

Treating the actions of allergies

Some treatments aim to reduce the effect of the inflammatory substances that cause the symptoms of an allergic reaction. Antihistamines block the action of histamine, reducing symptoms such as watering eyes and itching skin. Steroid nasal sprays reduce inflammation and mucus production in the nasal lining and the upper airways as do steroids for the lower airways, reducing congestion and breathing difficulties.

¹⁵ NICE guidelines [CG116]. (2001) Food allergy in children and young people. 1.1.18 and 1.1.19 [Last accessed May 2015]

Treating the symptoms of allergies

Some treatments tackle the symptoms of an allergic reaction. These include steam inhalation and washing the eyes or nose with water to relieve the symptoms from airborne allergens. Treating the symptoms usually provides only very short term relief.

Treating the cause

Allergen immunotherapy, also known as desensitisation, involves giving people increasing amounts of allergen via injections in the arm or as drops under the tongue to reduce their immune system's sensitivity to it. This is done under medical supervision starting with very small amounts: there is a small risk of producing a severe allergic reaction. Immunotherapy has been used to decrease symptoms and the need for medication¹⁶ for adults with severe hay fever¹⁷, allergic asthma¹⁸, severe allergies to animal dander and life-threatening allergy to insect stings¹⁹. Immunotherapy is still in the research phase for food allergies and a recent trial of immunotherapy for childhood peanut allergy has suggested that it may be of some use.

“KILLER NUT ALLERGY CURE SUCCESS AFTER KIDS BUILD UP TOLERANCE IN TRIALS”

In 2014, the Cambridge STOP II study hit the headlines when immunotherapy with peanut protein allowed children to eat some peanuts without a reaction.

Children, aged 7 to 16 years, were randomly divided into two groups, with one group given gradually increasing doses of peanut flour (oral immunotherapy), eating up to 800mg daily, and the other group avoided peanuts for 6 months²⁰. After this, the group who hadn't received the oral immunotherapy treatment received it and were tested (this is a crossover trial).

They found that 84–91% of the children were able to safely tolerate 800mg of peanut protein (the equivalent of five peanuts), at least 25 times as much peanut protein as they could tolerate before the immunotherapy.



Michael Perkin
Consultant in Paediatric Allergy

“Oral immunotherapy is not a treatment people should try on their own. It should only be done by qualified medical professionals in specialist settings because of the risks of severe reaction.”

SYSTEMATIC REVIEWS

The findings of individual research studies such as the STOP II trial do not always provide enough evidence to make decisions about new treatments. All studies answering the same research question need to be looked at together. Systematic reviews by organisations such as Cochrane, seek to identify, evaluate, combine and summarise the findings of all relevant individual studies. When done well, systematic reviews provide people with the best possible information about the effects of tests, treatments and advice.

TREATMENTS FOR ANAPHYLAXIS

Anaphylaxis, a potentially fatal severe allergic reaction affecting the entire body, is treated with an injection of adrenaline. People at risk of experiencing an anaphylactic shock carry injectable adrenaline in a device²¹. Adrenaline is injected into the outer thigh muscle as this avoids the risks of injecting into a vein but gives a fast enough rise in the blood level to be effective. This is important as severe anaphylactic reactions can be quickly fatal. (You might have seen TV shows where adrenaline is injected directly into the heart – this isn't a good idea. It can cause a hole in the heart or hit a lung.) The injections need to be followed by going to hospital for further treatment because the injection only treats the initial symptoms.

¹⁶ Wilson DR et al. (2005) *Allergy* 60:4-12

¹⁷ Di Bona D et al. (2010) *Journal of Allergy and Clinical Immunology* 126:558-566

¹⁸ Calamita Z et al. (2006) *Allergy* 61: 1162-1172

¹⁹ Boyle RJ et al. (2012) *Cochrane Library* 10:CD008838

²⁰ Anagnostou K et al. (2014) *The Lancet* 383: 1297-1304

²¹ Sheikh A et al. (2012) *Cochrane Library* 8:CD008935

03

WHY DO WE GET ALLERGIES?

There is still a lot that specialists do not know about allergies and their development in individuals and in populations. We do know that genetics, lifestyle and environmental factors all, separately or together, play a role in determining which of us develop allergies. Research is building up knowledge about specific causes for each type of allergy but we are not close to being able to set out a broad theory.



Adam Fox
Consultant Paediatric Allergist

“Why are some people sensitised (produce IgE antibodies to allergens) but not allergic (don’t display symptoms)? Why do some outgrow allergies and some not? These are the two holy grails for allergy researchers.”

With so much unknown, researchers have set research priorities. Food allergies have been researched more than others and peanut allergy is the most studied of all. Peanut allergy affects around half a million people in the UK and over 10 million people worldwide. It’s the most common cause of fatal food allergy reactions and, unlike other childhood food allergies such as cow’s milk, peanut allergy rarely goes away.

ALLERGIES CAN COME AND GO

Common food allergies such as those to egg and milk are frequently outgrown but researchers don't yet know why. Where nut, milk and egg allergies are outgrown, there seems to be a link with lower levels of antibodies in the blood²² but this hasn't been shown for other types of allergies. For allergies that resolve with age, people often continue with the restricted diets introduced in childhood long after the allergy has ended. Some restrictions cause problems with physical health, and staying on a restricted diet can be a contributing factor to eating disorders^{23,24}. If researchers could discover more about what causes the end of a food allergy, advice for patients could be developed.

Allergies can be acquired and lost. For example, early and continual exposure to dogs reduces the chance of developing a variety of allergies but if someone stops being exposed for an extended period of time – for example while away at university – they can develop an allergy to their pet. To complicate things, these 'acquired' allergies can either be temporary or permanent. Scientists are still trying to understand why this happens.

There is so much we don't know that it is difficult to develop robust public health advice. Even the small amount that we do know sometimes gets inappropriately generalised.

“EXPOSURE TO MICROBES”

**“DISHWASHERS CAN GIVE
YOUR CHILD ALLERGIES”**

**“WANT TO WARD OFF ALLERGIES?
PICK FOOD UP OFF THE FLOOR”**

**“GO EASY ON THE CLEANING,
NEW MOTHERS ARE TOLD”**

The theory that exposure to germs reduces a child's risk of developing allergies has been around for a while. It was first proposed as the **Hygiene Hypothesis** in 1989, which suggested that reduced levels of infection in early life were linked to an increased risk of developing allergies. This has developed into the **Old Friends Mechanism** theory which suggests that our likelihood of developing allergies is down to our microbiome (the diverse population of millions of microbes that live in and all over our bodies). Exposure in early life to a diverse range of largely non-harmful microbes and parasites that we have evolved alongside over millions of years helps us develop a properly regulated immune system that does not overreact to normally harmless allergens. The idea that children who have more childhood infections such as measles, chickenpox etc are less likely to develop allergies is now largely discounted.

Changes in the way we live, including less breastfeeding, more caesarean sections, smaller family size, urban rather than rural living and increased antibiotic use, have affected our early life exposure to microbial 'Old Friends'. Improved water quality, sanitation and urban cleanliness were vital in reducing infectious disease and childhood deaths over past two centuries. However, they have also inadvertently deprived us of exposure to the beneficial microbes we need.



Philip Steer

Emeritus Professor of Obstetrics and Gynaecology

“Unborn babies gain protective microbes from their mothers during delivery through the birth canal. A baby born by caesarean misses out this step which may be an important factor contributing to the 20% increase in allergy, asthma, obesity and diabetes seen in these babies. This doesn't mean that if there is a medical reason for a caesarean it shouldn't be performed, because the benefits would far outweigh the risks.”

²² Fleischer DM et al. (2003) *Journal of Allergy and Clinical Immunology* 112:183-189

²³ Sampson HA (1999) *Journal of Allergy and Clinical Immunology* 103:981-989

²⁴ Cummings AJ et al. (2010) *Allergy* 65:933-945



Adam Fox
Consultant Paediatric Allergist

“The influence of early use of antibiotics in infants on their microbiome and subsequent impact on the risk of allergy remains unclear. What is clear, however, is that babies are very vulnerable to bacterial infections and these must always be taken very seriously. If there is a clinical need for antibiotics, they should be used and the possible theoretical impact on allergies should not influence this decision.”

Multiple studies, carried out in a number of countries, have found that children who grow up on farms have lower levels of hay fever, asthma and other allergies. This, and other work, has shown that exposure to environments rich in microbes during childhood and whilst in the womb may have beneficial effects^{25,26}. Some of this work has linked raw milk to reduced allergies, but the risks of drinking it (it could contain harmful bacteria *Campylobacter*, *E coli* O157, or *Salmonella*) are likely to outweigh any possible benefits.

The Old Friends Mechanism is the predominant theory among allergy specialists. However misuse of the term ‘hygiene’ has persisted and has led people to believe that reducing levels of hygiene is a good idea, such as hand washing dishes instead of using a dishwasher. This can transmit disease. Instead, the advice from more developed research and understanding is to continue targeted hygiene practices such as hand washing, food safety, and toilet hygiene, while encouraging more everyday interactions with our environment, including getting outside and getting dirty²⁷.



Sally Bloomfield
Honorary Professor, London School of Hygiene and Tropical Medicine

“With people now spending up to 80% of their time indoors, the fundamental question now is ‘how can we develop an approach to hygiene which protects us against infectious diseases, but also reconnects us with the necessary microbial exposures required for the health of our immune system?’”

GENETIC DISPOSITION

Some people have a genetic tendency towards developing allergies. This is called atopy and is why being allergic can run in families. However, being atopic does not guarantee an allergy will develop, it just means it is more likely. Atopic family members frequently have different kinds of allergies to each other. Identical twins are more likely to have the same allergies²⁸. Genetic factors have a role but can’t help us predict exactly who will develop an allergy.

²⁵ Rautava S et al. (2012) *Nature Reviews Gastroenterology and Hepatology* 9:565-576

²⁶ Wlasiuk G & Vercelli D (2012) *Current Opinion in Allergy and Clinical Immunology* 12:461-466

²⁷ Bloomfield S et al. (2012) *A report by the International Scientific Forum on Home Hygiene*

²⁸ Sicherer SH et al. (2000) *Journal of Allergy and Clinical Immunology* 106: 53-56

EXPOSURE TO ALLERGENS

The case of exposure to allergens as a cause of allergy is even more complex. Sometimes exposure to an allergen helps reduce the risk of developing an allergy to it but sometimes exposure to an allergen brings on an allergy. Prolonged exposure to workplace materials such as flour, tobacco dust or the dander of animals can lead to the development of allergic conditions including occupational asthma. Occupational exposure can also give rise to contact allergies to substances such as latex in rubber gloves.

Parents worry about when to introduce foods that might cause allergic reactions into children's diets and there are no overarching rules to guide them. Researchers don't have a good idea why early exposure to some allergens can reduce rates of those allergies.

Researchers found that peanut allergies are more common in the UK than in a genetically similar population in Israel, where peanut-containing foods are eaten at an earlier age²⁹. In 2015, the results of a large study - Learning Early About Peanut Allergy (LEAP)³⁰ - showed that exposing young children who were at high risk of developing allergy to foods containing peanuts reduced the incidence of peanut allergy to just 3.2%, down from 17.2% in children who had not been exposed.



Michael Perkin

Consultant in Paediatric Allergy

"Peanuts are being introduced later and later into children's lives because of the public perception that they are a dangerous food, though for the majority, peanuts are of course not dangerous. Food allergy has gone up as the age of introduction of foods has gone up. It seems the avoidance paradigm hasn't alleviated allergies."

This may be true for food other than peanuts too. Randomised controlled trials have actually shown that avoiding certain foods during pregnancy does not reduce the risk of children developing allergies to that food³¹. The current advice to pregnant women is therefore simply to eat a normal balanced diet. Generally, your child is more likely to have a food allergy if there is a family history of them or of other allergic conditions such as asthma or eczema than because of pregnancy exposures.

NEW AVENUES FOR RESEARCH

Research so far has tended to focus on serious allergies especially peanut allergies. New avenues of research focusing more on population level factors have started to be explored including a possible link between vitamin D deficiency and risk of anaphylaxis³², changes in the climate of the Northern Hemisphere (leading to longer pollen seasons and changing distributions of plants), socioeconomic factors and stress. All of these can interact with our genes and change our microbial environment.

²⁹ Du Toit G et al. (2008) *Journal of Allergy and Clinical Immunology* 122: 984-991

³⁰ Du Toit G et al. (2015) *New England Journal of Medicine* 372:803-813

³¹ Fälth-Magnusson K et al. (1987) *Allergy* 42:64-73

³² Mullins RJ et al. (2009). *Annals of Allergy, Asthma and Immunology* 103:488-495

04

ALLERGY MYTHS

We don't know everything about allergy but research is giving us a better understanding. There has been an improvement in diagnosis and in patients being prescribed the most effective treatments. However, as we've seen, there are still many unknowns and people coping with conditions with little relief. These gaps in our knowledge have allowed some myths and outdated ideas to persist. Meanwhile new myths have emerged from lifestyle advice and misleading stories in the news or social media, and from people who take advantage of the uncertainties to market their alternative products or gain popularity for their ideas.

04. ALLERGY MYTHS

“ARTIFICIAL E-NUMBERS AND PRESERVATIVES IN FOOD CAUSE ALLERGIES”

E-numbers are food additives, both natural and synthetic, which are approved as safe for use by the European Food Standards Authority. Some of them are essential vitamins, for example E300 is vitamin C and E101 is vitamin B2. The only recorded allergies to E-numbers are to those made from naturally occurring substances, which contain proteins. Allergies are almost always triggered by proteins; therefore it is rare to have a food allergy to substances which are not proteins.

Since initial reports from the 1990s and early 2000s that E-numbers could be linked to childhood allergies, the research field has moved on and we now know that only a very small number of naturally derived additives can cause allergic reactions, but the media stories from the time are still being shared.



Moira Austin

Helpline & Information Manager,
Anaphylaxis Campaign

“Allergic reactions to additives may occur if the additive is of natural origin. The medical literature has seen reports of allergic reactions to annatto, a natural colour extracted from a seed, and to a red food colouring derived from the dried bodies of cochineal insects.”

“INCREASING EXPOSURE TO UNNATURAL CHEMICALS IS CAUSING A RISE”

Ambivalence about the benefits of modern living seems quite strongly focused on the need to reduce ‘man-made chemicals’ and the desire for a more ‘natural’ life or diet. This

has led to a demand for synthetic substances in products to be replaced by ‘natural alternatives’ made from animal and plant extracts. However, this actually increases the risk of exposure to allergens. For example, replacing synthetic compounds in soap with ‘natural’ wheat has led to more allergic reactions in people allergic to wheat.



Adam Fox

Consultant Paediatric Allergist

“Allergic reactions are the result of our allergic antibodies binding to particular proteins in the things we’re exposed to. Household chemicals seldom contain such proteins and hence, although they may contain chemicals that could, for example, irritate someone’s skin, allergy is very unlikely.”

A NOTE ON EXCEPTIONS

Most allergies are to naturally occurring substances because that’s what our immune systems have evolved to react to. Synthetic substances that have the same structure as the natural version, such as synthetic latex which has exactly the same molecular structure as natural rubber from trees, may well trigger a reaction in someone allergic to the natural product.

Nickel is one of the very few non-protein substances that cause allergic reactions, but in a nickel allergy the body isn’t reacting to the nickel itself. Nickel molecules bind to proteins they come into contact with in the body, changing the shape of the proteins, and causing the immune system to respond to these proteins as if they were foreign invaders.

04. ALLERGY MYTHS

A NOTE ON EXCEPTIONS

Sulphites, also known as E-numbers E220-229, have been used as preservatives in some foods and drinks since Roman times. Sulphites are commonly blamed for perceived allergies to wine. Sulphite allergies do exist but are very rare; the majority of people who think they are allergic to sulphites are probably experiencing a non-immune reaction (known as an irritant reaction), perhaps caused by dilated capillaries which cause people to sneeze, flush and wheeze. Wine has relatively low levels of sulphites compared to other foods.



Moira Austin

Helpline & Information Manager,
Anaphylaxis Campaign

"In sensitive people, sulphites can cause unpleasant symptoms including lung irritation and asthma. But the alcohol in the wine may also be acting to make them more sensitive."

"TOXIC OVERLOAD"

Some natural health clinics and books claim that allergies are caused by the build-up of toxic substances in our body, such as heavy metals, processed foods and chemical additives, creating a tipping point called 'toxic overload'. Part of this theory is that the 'toxins', and processed sugar which is often accused here, are causing our bodies to be in a state of heightened inflammation and therefore causing allergies to develop.

There are components of modern life which increase the chance of allergy. Anything that changes our microbiome (see section 3), for example, such as moving from a farm to a town, might change our allergy risk. But no evidence has been found for a link between 'toxins' and allergies, and inflammation, if it does occur, involves a different part of the immune system to allergic reaction.

"FAST FOOD CAUSES ALLERGIES"

**"JUNK FOOD STARTS ALLERGIES:
WESTERN HIGH-FAT DIETS
ARE BLAMED FOR SURGE IN ILLNESS"**

**"FAST FOOD AND TAKEAWAYS
LINKED TO SURGE IN CHILD
ASTHMA AND ALLERGIES"**

Research into Western fast food has prompted media claims that it's causing an allergy epidemic in developed countries. In fact the researchers in these studies have not made that link. In one, they actually looked at the association between diet and gut bacteria³³. Another, published in 2013, did not find a causal link, only an association, which could be due to too many other factors for a conclusion to be drawn³⁴.

The focus on 'junk' food is a red herring. Ninety percent of food allergies are to a very small number of foods, notably eggs, milk, fish, shellfish, peanuts, tree nuts, wheat and soy. If any food contains these ingredients then some people will be allergic to it, however it has been prepared.



Adam Fox

Consultant Paediatric Allergist

"There are plenty of good health reasons not to eat lots of fast food but, based on current evidence, an increased risk of allergy is not one of them."

³³ De Filippo C et al. (2010) Proceedings of the National Academy of Sciences 107:14691-14696

³⁴ Ellwood P et al. (2013) Thorax 68:351-60

04. ALLERGY MYTHS

“EACH REACTION WILL BE WORSE THAN THE LAST”

The belief that allergic reactions become more severe each time a person is exposed to an allergen is false. Lots of factors influence the strength of an allergic reaction including the amount of allergen, the route and site of exposure, combined with alcohol, exercise, stress, sleep deprivation and drugs. It is still not known why some of these factors make reactions worse.



Tariq El-Shanawany
Consultant Clinical Immunologist

“Many factors contribute to how severe (or mild) a reaction is. It certainly is not the case that reactions get worse every time, and indeed some allergies get milder as time goes on.”

“NATURAL TREATMENTS ARE BETTER THAN PHARMACEUTICALS”

‘Natural’ food allergy treatments can easily be found online. Many products containing royal jelly (the food produced by the queen bee for her workers) are sold in health food shops as a ‘natural’ treatment for seasonal allergies and hay fever. There is no evidence to back this up. What’s more, it could be dangerous for people to substitute these for their prescribed treatment, (for example, the steroids that control their asthma), because these untested (and expensive) treatments themselves are potential allergens. There have

been several cases of people with asthma and bee sting allergies suffering breathing difficulties and anaphylaxis caused by an allergic reaction to the royal jelly^{35,36}. Other diet trends to reduce allergies come with risks; you can get *E. coli* food poisoning from drinking ‘raw’ unpasteurised milk.

HONEY TO CURE HAY FEVER?

Honey producers have started selling local honey as a cure for local people experiencing hay fever. They contend that as all honey contains some pollen from the flowers the bees visited, these tiny traces of pollen can desensitise people and reduce their allergic reactions to windborne pollen.

This is unlikely to work. People with allergies are not generally allergic to pollen from flowers, which is usually the pollen bees collect, but are allergic to pollen from grasses and trees, which is windborne³⁷. The pollen in the air that people in the UK are exposed to is not just from nearby plants but a mixture of pollen that could be from as far as continental Europe. Local honey may well contain none of the pollen that triggers a person’s allergy. Even if it did, it would be a poor candidate to achieve desensitisation as it’s impossible to regulate the level of allergens in honey.

³⁵ Leung R et al. (1995) *Journal of Allergy and Clinical Immunology* 96:1004-1007

³⁶ Thien FCK et al. (1996) *Clinical and Experimental Allergy* 26:216-222

³⁷ National Institute of Allergy and Infectious Disease: Pollen Allergy (2012) [last accessed May 2015]

04. ALLERGY MYTHS

“IMMUNISATIONS CAUSE ALLERGIES”

There were some anecdotal cases and small poorly designed studies which suggested that vaccines could cause allergic reactions and proposed mechanisms of how that could happen, for example by prevention of early childhood infections (the hygiene hypothesis). These ideas have not been borne out by research: in large well-controlled epidemiological studies no link between immunisations and allergies has been found.

In the past, it was thought that the Measles, Mumps and Rubella (MMR) vaccine was not suitable for children allergic to eggs because it is produced using egg protein. This is no longer the case: the vaccine is now grown in cells derived from chickens, which contain negligible amounts of egg protein. Despite information provided with the vaccines continuing to state potential effects for egg allergic children, the MMR vaccine is considered safe for them.



Paul Seddon
Consultant Paediatric Allergist

“Reluctance by parents or health professionals to give a child with any degree of egg allergy the MMR vaccine exposes the child to the risk of unnecessary infections. Current UK guidelines are that egg allergy is not a reason to avoid MMR vaccination, and children with mild egg allergy should receive vaccinations in the normal way in the GP surgery. As a precaution, children with a previous anaphylactic reaction to egg may be advised to receive their first MMR vaccination at hospital”³⁸

“HYPOALLERGENIC MEANS ALLERGEN-FREE”

Some products are marketed with claims to be hypoallergenic, such as pillows, cosmetics and jewellery. This may sound as though they contain no allergens, but hypoallergenic actually refers to materials that are relatively

unlikely to cause an allergic reaction, that is, relative to other things that may be known to do so. Products labelled 'dermatologically tested' are tested on the skin of volunteers who do not have allergies rather than on people who do. There is no regulation of hypoallergenic claims so they are a matter of trust and good faith between producers and consumers.

HYPOALLERGENIC PETS?

Despite the Obamas' high profile purchase of an 'allergy-free' dog, Bo, there is no such thing as an allergen-free or hypoallergenic cat or dog. Pet allergens come from different parts of the animal and commonly it's pet dander that causes reactions. Dander is skin cells that have been shed. It is not possible to eradicate all dander and breed a completely allergen-free pet. Some breeds produce less dander than others, but they may still cause allergic reactions. Allergies to animals are complicated and some people may react to certain breeds whilst tolerating others.

“GM FOOD CAUSES ALLERGIES”

Some organic marketing and campaigns have claimed that genetic modification (GM) of plants creates new proteins that can trigger allergies. These campaigns have been effective: surveys of consumers who do not want to buy GM food cite allergy as one of their main concerns.

Genetic modification is usually done to make the plant produce proteins it would not have produced before – to defend itself against insect attack for example. As most allergies are to proteins and in theory all proteins have the potential to cause an allergy, it's reasonable to ask if GM can cause new allergies. In fact the proteins produced are no different to the same protein produced in any

³⁸ Offit PA et al. (2003) *Pediatrics* 111:653-659

04. ALLERGY MYTHS

plant bred conventionally and wouldn't inherently be more likely to cause an allergy. If someone is allergic to soy, they will be allergic to soy from both conventionally bred and GM-bred plants.

Genetic modification is actually being investigated as a way to reduce allergies. For example, plant scientists in the US have produced a peanut that doesn't produce two of the proteins that are involved in causing allergic reactions for example.

Allergies are more likely to occur when new foods are introduced into countries, no matter how they are bred. Kiwifruit was introduced into the US in the 1960s, but were not initially included in the list of substances routinely tested for when diagnosing allergies because they were an established food elsewhere. However, it turned out that kiwifruit allergy became among the top 20 most common food allergies in America.

MILK THAT WON'T CHURN YOUR STOMACH...?

After huge commercial success in Australasia, a2 Milk has recently arrived in the UK. This new product is different from normal milk, it contains the A2 type of the beta-casein protein instead of the A1 type.

On their website, the a2 Milk company claims the existence of an intolerance to A1 protein in milk, stating: "Lots of people feel the same [have symptoms of lactose intolerance] and many of them assume they may be lactose intolerant. For millions of people this may not actually be the case. Instead, they may be reacting to an intolerance to the A1 protein..." Except that the best scientific evidence suggests that A1 protein intolerance does not exist. The position of the Dietitians Association of Australia is that "there is no solid scientific evidence demonstrating that a2 milk is better for you than regular milk.³⁹" This company is marketing a product for a condition that the best scientific evidence suggests does not exist.

"YOU CAN PRIME YOUR BABY'S IMMUNE SYSTEM"

This may be true in specific ways but anyone giving very general advice about exposing babies to allergens is likely to be wrong and may be giving dangerous advice, because there is still much that we don't know. Research has shown that exposing children with eczema to low doses of peanut protein through the skin is a major risk for peanut allergy,⁴⁰ but in 2015 the LEAP study was published. This showed eating peanut early as a weaning food (ie, high dose oral exposure) seemed to promote tolerance of peanuts.

While so much of the research is ongoing, there aren't many of the definitive answers that we want – about why allergies are affecting modern societies or how to stop its effects on us individually. There is a lot of outdated information in people's anecdotes and on websites. And, inevitably in an area of such uncertainty and frustration, there is a lot of commercial opportunism. So the source of information about allergies becomes all the more significant, not least to find out what the most up to date information is. Trusted sources are listed on page 23.

We hope that the more established knowledge about allergy set out in this guide, the reminders of what we know is not true and the contributions of practitioners, will continue to be helpful for time to come. It is important to remember though that where we have used specific studies for illustration, these too may become open to challenge if later studies don't find the same results. This uncertainty may sound like bad news for getting answers, but rather it is a good sign that research is moving forward in an area that affects so many lives.

³⁹ Which milk should I drink? Dietitians Association of Australia: <http://daa.asn.au/for-the-public/smart-eating-for-you/frequently-asked-questions/which-type-of-milk-should-i-drink/> [Last accessed May 2015]

⁴⁰ Fox AT et al. (2009) *Journal of Allergy and Clinical Immunology* 123:417-423

05

MORE INFORMATION AND SOURCES

The information in this guide or anywhere else is not a substitute for medical advice

IF YOU THINK YOU HAVE A FOOD ALLERGY...MAUREEN JENKINS FROM ALLERGY UK SHARES SOME ADVICE:

- "Keep a food and symptoms diary to see if your symptoms relate to specific foods"
- "See your GP"
- "Try food exclusion under medical advice only - only continue to exclude a food if you have convincing and long-lasting benefits, as initial changes may be the result of placebo effects"
- "If you're eating something and it's not giving you any symptoms, don't stop"

RESOURCES

BRITISH SOCIETY FOR IMMUNOLOGY
allergy resources
www.immunology.org/allergies

COCHRANE LIBRARY SPECIAL COLLECTION
"Allergies: treatment and prevention" - this Cochrane Library Special Collection brings together recent systematic reviews of the evidence for treating and preventing allergies.
http://bit.ly/Cochrane_Allergy_Treatment_and_Prevention_review

BRITISH SOCIETY FOR ALLERGY & CLINICAL IMMUNOLOGY
information about common allergies
www.bsaci.org/resources/most-common-allergies

ALLERGY ACADEMY
list of useful resources for information on allergies
www.allergyacademy.org/resources

ANAPHYLAXIS CAMPAIGN
information and advice for people with severe allergies
www.anaphylaxis.org.uk/living-with-anaphylaxis

ALLERGY UK
helpline and website information about causes, treatment and diagnosis of allergies
www.allergyuk.org/about-allergyuk-menu/about-allergy-uk

ASTHMA UK
advice on asthma triggers and how to deal with them
www.asthma.org.uk

LABTESTS ONLINE UK
referenced information about unvalidated tests
www.labtestsonline.org.uk/understanding/analytes/unvalidated-tests/

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE (NICE) ALLERGY TESTING GUIDELINES
guidelines for diagnosing food allergies in children and young people
www.nice.org.uk/guidance/cg116

NHS BEHIND THE HEADLINES
providing evidence based analysis of health stories in the media
www.nhs.uk/news/Pages/NewsIndex.aspx

NHS CHOICES
general information about allergies and intolerance
www.nhs.uk/conditions/Allergies/Pages/Introduction.aspx

BRITISH DIETETIC ASSOCIATION
food fact sheet about allergies and intolerance
www.bda.com/foodfacts/Allergy

ROYAL PHARMACEUTICAL SOCIETY
information about hay fever medication
www.rpharms.com/what-s-happening-/news_show.asp?id=1255

INTERNATIONAL SCIENTIFIC FORUM ON HOME HYGIENE (IFH)
information on how to target our hygiene to maximise protection against exposure to infectious diseases, whilst gaining exposure to Old Friends microbes.
www.ifh-homehygiene.org

PARTNERS

Organisations that helped put this guide together and can provide more support and specific information:

BRITISH SOCIETY FOR IMMUNOLOGY

www.immunology.org

The British Society for Immunology represents scientists and clinicians who study the immune system, including allergies. We support and promote excellence in research and clinical practice in immunology for the benefit of human and animal health and welfare.

COCHRANE UK

www.uk.cochrane.org

Cochrane is a not-for-profit, global independent network of researchers, professionals, patients, carers and people interested in health. Cochrane Reviews are systematic reviews of primary research in human health care and health policy and are used internationally as a trusted source to inform evidence-based health care. They are published online, in the Cochrane Library. www.cochranelibrary.com

BRITISH SOCIETY FOR ALLERGY & CLINICAL IMMUNOLOGY

www.bsaci.org

The national, professional and academic society which represents the specialty of allergy at all levels. Its aim is to improve the management of allergies and related diseases of the immune system in the United Kingdom, through education, training and research.

ALLERGY ACADEMY

www.allergyacademy.org

The King's College London Allergy Academy seeks to provide education in allergy to everyone who wants it; they provide information tailored to your need.

ALLERGY UK

www.allergyuk.org

A UK charity that provides information, advice and support for people with allergic disease and their carers.

ANAPHYLAXIS CAMPAIGN

www.anaphylaxis.org.uk

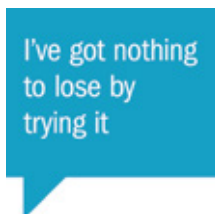
Provide information and support to people at risk of serious allergic reactions and anaphylaxis, focusing on medical facts, food labeling, risk reduction and allergy management.

ASTHMA UK

www.asthma.org.uk

Work across the UK. They fund world class asthma research, campaign to improve the quality of care received by people with asthma and help hundreds of thousands of people a year with their expert advice and support.

SENSE ABOUT SCIENCE is a charity that helps people to make sense of science and evidence in public debate. We are a source of information, we counter misinformation and we champion research and high quality evidence. We work with thousands of researchers and hundreds of organisations across civil society.



I'VE GOT NOTHING TO LOSE BY TRYING IT: a guide to weighing up claims about cures and treatments.



I DON'T KNOW WHAT TO BELIEVE: a short guide to peer review.



MAKING SENSE OF TESTING: why scans and health tests for well people aren't always a good idea.



MAKING SENSE OF CHEMICAL STORIES a guide for the lifestyle sector and anybody with questions about chemical stories.

IF YOU ARE...

...a commentator, medical charity, journalist, employer, educator, national body, information service, local authority, parliamentarian, health care provider, professional association, community group, NGO, lifestyle writer

...or any other civic group in need of help or comment on a difficult or controversial area of science call Sense About Science on **020 7490 9590**.

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