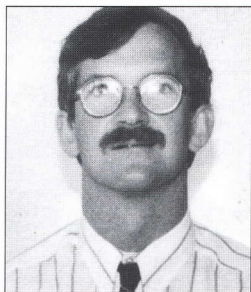


# Food Allergy

## What every doctor should know!



### Curriculum Vitae

Adrian Morris graduated from the UCT Medical School in 1983. After his housemanship at Groote Schuur Hospital, his SHO posts included paediatrics at Red Cross Children's Hospital and Emergency Medicine at Groote Schuur Hospital. He then completed GP Vocational Training in Surrey, England, before returning to Cape Town in 1988 to join a group family practice in Newlands. He obtained the DCH(SA) in 1989 and the MFGP(SA) in 1990. Allergy and Clinical Immunology are his special interests. He is a member of the British Society for Allergy and Clinical Immunology, and was a delegate at their last three annual conferences. Whilst in England, he attended the BSACI GP Training Course in Allergy. He has served on the Executive Committee of the Allergy Society of South Africa since 1991, running the Patient Education portfolio. He also works as a part-time Allergologist at the Allergy Clinic at Red Cross Children's Hospital in Cape Town.

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### Summary

*Food allergy has become a very popular subject and doctors need to be aware of the nutritionally deficient diets which parents introduce to their children without proper supervision. Unfortunately, there is still need for objective and reproducible diagnostic tests, therefore some practical advice is offered in this article to help in this regard, and tables with lists of potentially allergenic foods and recommended elimination diets are provided.*

Food allergy has unfortunately long been considered to be a type of fad topic and the Cinderella subject of fringe medicine. This is mainly due to the lack of objective and reproducible diagnostic tests to eliminate personal bias and psychological factors that account for the controversy in confirming food allergy. Up to 15% of the population report having had adverse food reactions. The true prevalence of food allergy is lower and seems to range from 1% to 4% of the general population, about 6% of the paediatric population but does occur in as much as 25% of children with atopic eczema. Consequently the public perceive that food-related allergy is underdiagnosed, whilst many doctors feel that it is over diagnosed.

### Adverse reactions to food may be divided into:

- **Immune mediated reactions** to food via *immediate* hypersensitivity (IgE) and *delayed* T-cell mediated or immune complex type

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Labelling

10%



mechanisms (non-IgE). These reactions depend on the intestinal mucosal integrity and the individual's ability to mount an abnormal immune response. This is true food allergy and accounts for 10% of adverse reactions to food.

- **Non-immune mediated reactions** such as malabsorption due to gastro-intestinal enzyme deficiencies (lactose intolerance), adverse reactions to naturally occurring toxins in food (salicylates, histamine and tyramine), as well as reactions to food containing contaminants (bacterial endotoxins), preservatives (sodium benzoate and sulphites), flavourants (mono sodium glutamate) and colourants (tartrazine). This is referred to as *food intolerance* and accounts for 90% of adverse reactions to food.

## Pathophysiology

**Food allergic** sensitisation may occur in infants if there is a breach in the intestinal mucosal integrity and an adverse immune response to a foreign food protein penetrating the intestinal mucosa. Certain foods seem to be more allergenic than others (Table 1). Fortunately enzymatic degradation of food in the intestinal tract tends to reduce this allergenicity. Secretory IgA also plays a role by combining with the allergens on the intestinal epithelial surfaces, further reducing allergen penetration. Mast cells which release allergy mediators such as histamine are present in the gastrointestinal mucosa and are found in increased numbers in allergic diseases. If mucosal barriers are weakened by inflammatory disease or IgA deficiency, allergen sensitisation and allergic disease is more likely to occur. In infancy, reduced digestive

capability and increased epithelial permeability are factors which enhance allergic sensitisation to foods. As the gastrointestinal mucosal barrier naturally improves with age, so does the incidence of food allergy tend to decrease with

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**Table 1. Commonly recognised potential allergenic foods.**

Common Food Allergens	Other Food Allergens
Hens egg white	Fruit : Strawberry, Orange, Peach, Apple, Coconut
Cow's milk protein	Meat : Beef, Pork
Fish	Nuts : Hazel Cashew, Almond, Sesame seed, Brazil
Wheat	Seafood : Crab, Shrimp, Lobster, Squid, Mussel
Peanut	Vegetables : Tomato, Bean, Mustard, Cabbage, Potato, Pea
Soya bean	

age. Food is most allergenic in the fresh form and cooking reduces or eliminates this allergenicity.

**Additives** such as sulphites affect up to 40% of children with asthma, they are commonly ingested in soft drinks and some foods, and the sulphur dioxide gas then eructed from the stomach results in throat irritation and bronchospasm. Atopic individuals also seem to have low levels of sulphite oxidase, the enzyme which normally metabolises sulphites present in the diet.

Sensitivity to tartrazine, the yellow food colourant is, despite its lay publicity, quite a rare cause of food intolerance, affecting only 0,1% of the population. This colourant seems to act by causing histamine release via non-immune mechanisms and so exacerbates the symptoms of atopy.

Prevalence is actually low: between 1% - 4% of the general population.



Certain atopic individuals with reduced levels of the histamine degrading enzyme diamine oxidase develop sneezing, flushing, rhinorrhoea, headaches and dyspnoea after ingesting foods rich in histamine. This reaction seems to be quite common and is often confused with food allergy.

## Clinical Manifestation

Allergic reactions to food may manifest in the form of nausea, vomiting, flatulence, abdominal pain, cramping, diarrhoea and with non gastrointestinal illness such as urticaria, atopic dermatitis, tissue erythema, rhinitis, wheeze, angioedema and in some cases acute life threatening anaphylaxis. Fresh fruit, vegetables and spices may cause local mucosal reactions in the mouth and throat – the so called Oral Allergy Syndrome (OAS). Up to 30% of food allergic adults develop urticaria, rhinorrhoea, flushing, shortness of breath and syncope following strenuous exercise – this food related, Exercise-Induced Anaphylaxis (EIA) may occur for up to 24 hours after ingesting an offending allergen (such as shellfish, celery and wheat). Evidence now suggests that Coeliac disease may be due to delayed T cell-mediated allergy to dietary gluten. Preservatives and other additives tend to predominantly induce non-GIT reactions such as urticaria, bronchospasm and exacerbate eczema. There is still considerable controversy as to whether the hyper-activity syndrome and migraine are allergic in nature – so far scientific evidence is in conflict, but so-called Myalgic Encephalomyelitis (ME) and the Candida Syndrome do not appear to have any allergic aetiology.

Only when the adverse reaction

occurs immediately after ingestion of the causative food may the diagnosis of food allergy be easy to make. Otherwise with delayed reactions to food, such as when cell mediated and immune complex mediated mecha-

Food allergy versus food intolerance.

## Table 2. Elimination Diets

### 0 – 6 months of age

Nutramigen (if unavailable use Soya milk).

### 6 – 24 months

Nutramigen (if unavailable use Soya milk)

Rice and Maize cereal, Rice cakes

Lamb meat

Cooked Pears

### 2 years or older

Rooibos Tea (only sugar may be added)

Rice and Maize (cereals and bread)

Lamb and Chicken meat

Canned pears, apricots, prunes and their juices

Sunflower or olive oil

Cooked beetroot, sweetpotato, carrots

Lettuce

nisms are involved, the offending substance is very difficult to isolate.

Infants tend more commonly to develop allergies to hen egg white, cow's milk protein, wheat, peanuts, fish and even soya protein, whilst adults tend to be allergic to foods such as fish, shellfish, peanuts, tree-nuts, tomatoes and chocolates. Although the above foods are more commonly implicated in food allergy, almost any food can be a potential allergen.

Cooking reduces the allergenicity of food.

## Diagnosis of food allergy

Food allergy usually manifests in infants with feeding problems and a



family background of atopy. The diagnosis is dependent on a clinical history suggestive of food allergy, with symptom improvement on withdrawing the offending food from the diet. The physical examination is often not particularly informative. Diagnostic tests also tend to be disappointing as they can only determine IgE mediated allergy (ie skin prick tests, total IgE, Pharmacia Food Mix Fx5 and individual RASTS). Food allergy in the form of delayed T cell-mediated (Type IV) and circulating immune complex (Type III) reactions are far more difficult to diagnose. Therefore provocation challenge testing is the best way to confirm the diagnosis in suspected food allergy.

The diagnostic "gold standard" is the double blind placebo controlled food challenge test (DBPCFC). In reality it is very difficult to perform outside an orderly academic inpatient hospital environment. In the family practice setting, if a specific food is thought to be implicated, a trial exclusion diet is implemented, followed by the diagnostic re-introduction of the offending food. If no obvious food is suspected, then a simple elimination diet for two to four weeks is indicated. It should consist of only the following hypo-allergenic foods: lamb meat, polished rice, gluten free bread, rice crispies, pears, barley sugar, water and sunflower or olive oil.

Once the allergy has settled on this diet, other foods are slowly re-introduced one at a time until the allergy provoking food is identified. Foods that can be slowly re-introduced during the provocation testing period include: fish and seafood, pork and beef, nuts, chocolate, legumes, white potatoes,

oranges, strawberries, cow's milk, pizza, fresh fruit and finally hen's eggs. If, despite the elimination diet, the symptoms persist then the cause of symptoms is probably not food allergy related. If available, a trial of Vivonex, a hypoallergenic elemental diet, could be considered if food allergy is still strongly suspected.

## Food allergy prevention

Maternal diet in pregnancy seems to play little or no role in the infant becoming food allergic, so dietary manipulation is not recommended in pregnancy.

The most effective form of food allergy prevention in "at risk" infants is unsupplemented breast feeding to at least six months of age. Beware of the nurse who inadvertently gives top-up feeds of cow's milk formula in the neonatal nursery. Cow's milk contains 80% casein and 10% whey (B-lactoglobulin). The whey fraction is most allergenic (interestingly, breastmilk is devoid of B-lactoglobulin). The breastfeeding mother must avoid eating the common allergenic foods such as eggs, milk and peanuts, as traces can pass into the breast milk and sensitise the infant. If breast feeding cannot be established then a hypo-allergenic milk formula such as Nutramigen (casein hydrolysate) or Alfare (whey hydrolysate) should be used. If Nutramigen is unavailable soya milk may be used, but soya is potentially allergenic. Goat's milk can cross-react with cow's milk (both contain B-lactoglobulin), so is a poor alternative and also lacks adequate folic acid.

Potential food allergens in the diet, such as cow's milk and wheat, should be avoided for the first year of life, with eggs, peanuts and fish being

Hyper-activity and migraine not clearly allergic in nature.

Almost any food can be a potential allergen.

Physical examination not particularly helpful.



introduced only after 18 months of age. Factors that promote allergic sensitisation such as maternal cigarette smoking, air pollution and viruses should be avoided whenever possible. Avoidance is easy to prescribe but in reality is very difficult to implement. Therefore the strictness of the diet often depends on the severity of the food allergy symptoms. Most food allergic children eventually tolerate milk, wheat, eggs and vegetables but remain allergic to fish and nuts.

## Pitfalls in food allergy treatment

Food allergy is most common in the paediatric age group and cow's milk allergy seems to be commonest followed by gluten or wheat allergy. Often infants will also develop an allergy to the soya milk and very rarely may even have an adverse reaction to the hypoallergenic casein hydrolysate in Nutramigen.

Once the food allergy is diagnosed, an exclusion diet is instituted. Calcium needs to be supplemented in cow's milk-free diets, and vitamin B in wheat-free diets. A certain amount of cross-reactivity occurs between foods of similar classes and this should be borne in mind if symptoms recur on specific food avoidance. This may be due to the presence of a panallergen called Profilin common to fruit, grass and vegetables and which accounts for the cross-reactivity we see between different food groups. Hidden allergen sources also need to be identified as processed foods in South Africa are notoriously inadequately labelled.

If an essential foodstuff needs to be excluded from the diet, a dietitian should be consulted for advice so as

to ensure the diet is nutritionally adequate. Restrictive diets run the risk of inducing malnutrition, are costly to implement, cause anxiety in the family, result in the child being over protected and may cause social isolation. If the diet does not work, then great disappointment and anger may ensue within the family.

## All sources of the allergen should be excluded

If milk is implicated, then all sources of milk such as butter, cheese, buttermilk, chocolate, cream, ice-cream, yogurt and casein should be avoided and the diet supplemented with calcium and vitamin D. In wheat allergy avoid cereals, crackers, pasta, snacks, bread, malt, gluten, sweets and supplement vitamin B and iron. In egg allergy avoid egg white, albumen, egg lecithin, mayonnaise and other hidden sources of egg such as processed foods and batter. In severe hen egg allergy, children should be skin tested with dilute (1:10) MMR vaccine before it is administered. Peanuts may be hidden in soups, Chinese foods, marzipan and used as a bulking agent in many processed foods, they can even cross-react with peas and bananas. Soya protein, found in infant milk formulas, baked foods, canned tuna, soups and sauces, is another allergen encountered.

The main thrust in food allergy treatment is specific allergen avoidance. Drug treatment may sometimes need to be instituted if symptoms are severe and includes antihistamine, adrenaline and corticosteroid medication. Preventer medication such as ketotifen (Zaditen) and cetirizine (Zyrtec) should be recommended in the paediatric age group. This might

Provocation challenge testing is the best way to confirm suspicion.

Leave out cow's milk and wheat during baby's first year.

Processed foods in RSA notoriously inadequately labelled.



reduce food allergen reactivity and slow the so-called "allergy march" on to atopic eczema, asthma and allergic rhinitis, which are common sequelae to food allergy. Unfortunately, it appears that severe food allergy is commonly associated with the early onset of severe asthma, irrespective of dietary manipulation. At present studies are being undertaken in Europe to assess whether preventer medicines can, in fact, stop the "allergic march" – the so-called Early Treatment of the Allergic Child (ETAC) concept. The role of oral desensitisation needs to be further evaluated, and may be a future therapeutic option for severe reactions to unavoidable food allergens.

Finally, cautious re-introduction of a "prohibited" food can be attempted after 6-12 months as the natural history of food allergy is for gradual improvement.

## Conclusion

Not all food allergic manifestations are IgE mediated and other mechanisms such as T cell-mediated (Type IV) and immune complex mediated (Type III) reactions, for which no diagnostic tests are available, should be considered, when conventional skin and blood tests are negative.

When evaluating food allergy, one must also be wary of unproven diagnostic and therapeutic regimes. Practitioners should be aware of the fact that the publicity and "popularity" surrounding food allergy has spawned a new form of "Munchausen by proxy" – where the parent, convinced that their child's symptoms are secondary to food allergy, institutes bizarre and nutritionally deficient diets.

All exclusion diets must include adequate amounts of protein, carbohydrate, essential fats, vitamins and minerals.

The advice of a qualified dietitian should be sought if foods are excluded from the diet for any length of time and lists of qualified dietitians can be obtained from: ADSA, PO Box 4309, Randburg, 2125.

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Food allergy has become 'popular' and parents can easily put a child on a nutritionally deficient diet.

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## Appendix: Sources of Food Additives and Naturally Occurring Irritants

### Dietary sources of Sulphites

40% asthmatic children

Dried fruit  
Cold meats  
Wine & Beer  
Salad Bar Lettuce  
Molasses  
Soft drinks (Brooks, Lecol, Monis, Fruit Tree, Oros, Roses Lime)

### Dietary sources of Sodium Benzoate

Soft Drinks (Diet Coke, Tab, Lecol Fanta, Bonnita, Dairybelle, Fortris, Game, Sparletta, Kenwood cascade, Sprite, Krest)  
Margarine  
Marmalade  
Mayonnaise  
Bananas and Berries  
Chocolate  
Ready-made foods

### Dietary sources of Mono Sodium Glutamate (MSG)

Chinese food  
Gravy  
Potato chips  
Tomatoes  
Soy sauce  
Seasoning salts (Aromat)  
Processed foods  
Mushroom and Cheese

### Dietary sources of Salicylates

Curry powder  
Paprika  
Dried Thyme  
Oranges  
Tea  
Worcestershire sauce  
Almonds, apples, peaches

### Dietary sources of Tartrazine

Cheese  
Meat tenderiser  
Orange drinks  
Medication  
Potato Chips  
Sweets  
Hot dogs

### Foods containing high levels of Histamine

Fish	Tunny, Sardine, Anchovy, Mackerel
Cheese	Emmenthal, Gouda, Roquefort, Camembert, Cheddar
Cured Meat	Salami, Dried ham
Vegetables	Pickled cabbage, Spinach, Ketchup (Tomatoes)
Alcohol	Red wine, White wine, Sparkling wine, Beer

### Drinks that contain no preservatives

Clifton Instant, Ceres, Liquifruit, Appletiser, Grapetiser, Pick 'n Pay no name brand, Purity baby drinks and Safari prune juice