

THE ABC OF DIETARY MANAGEMENT OF PEANUT AND NUT ALLERGY

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ABSTRACT

The global rise in food allergy, including peanut and nut allergies, is well-documented. Nut allergies are the most common cause of life-threatening food-allergic reactions and safe dietary management has classically meant complete nut avoidance. However, recent studies on the primary prevention of allergy and on the facilitation of oral tolerance demonstrate that, on a tailored and informed basis, more active dietary management of nut allergy is recommended. Many specialist allergy centres are already advising safe selective nut eating. A multidisciplinary approach including education regarding food ingredients and regulatory aspects of food labelling is essential to minimise risks and optimise quality of life in this active dietary management of nut allergy. This article examines the practical aspects of supporting patients through this approach, signposting recent and new relevant literature. A brief look at digital tools available to facilitate the safety and variety of a patient's food choices highlights new options for a more patient-specific and tailored approach for potentially improved self-care in food allergy. We await further published evidence due shortly on the potential benefits of safe selective nut eating and on threshold levels for better risk assessments.

BACKGROUND

Food allergy, especially peanut and nut allergies in Westernised countries, is rising and the reasons are multifactorial. UK and US figures approximate that 3–4% of adults and 6–8% of children are affected by diagnosed food allergy and even greater numbers are affected by self-reported food allergy.¹ The South African Food Sensitisation and Food Allergy (SAFFA) study² found that 2.5% of one to three-year-old children in Cape Town had a challenge-confirmed food allergy, most commonly to egg (1.9%), with a peanut allergy (PA) prevalence of (0.8%) and lower of hazelnut. While this is below the PA prevalence rates of up to 5% quoted in Western countries such as Australia, the United Kingdom and the United States, as well as the one in five children with eczema, who will develop PA by the age of five years quoted in the Learning Early About Peanut Allergy (LEAP) study,³ allergy prevalence literature in the developing world confirms that food allergy is on the increase,^{4,5} as access to food is more global and homogeneous than in the past.

Due to the potential for severe or life-threatening reactions in nut allergy, logically, the most straightforward and overtly safe approach to prevent children from developing food allergy is to avoid consuming allergenic foods. A diagnosis of peanut or nut allergy classically meant complete nut avoidance, however, practice is now changing following interesting evidence from primary food-allergy prevention studies. The facilitation of oral tolerance is being further investigated with respect to the assessment of safety, feasibility and the impact on quality of life (QoL) of eating certain 'safe' nuts for children with a known nut allergy.

This article examines the practical aspects of supporting patients through this approach, signposting recent and new relevant literature. We also present digital tools available to facilitate the safety and variety of a patient's food choices through a more personalised approach. Not all allergy practices enjoy the benefit of a specialist dietitian or tertiary allergist, hence some knowledge of current considerations in nut and PA management will benefit patients and professionals and therefore improve the quality of care and QoL.

TABLE I: THE POTENTIAL BENEFITS AND CHALLENGES OF SELECTIVE NUT EATING

	POTENTIAL BENEFITS OF SELECTIVE NUT EATING	CHALLENGES OF SELECTIVE NUT EATING
For the patient and family	Improved QoL through reassurance in presence of safe nuts and more dietary options.	Precautionary allergen labelling (PAL) can be difficult to risk assess. Individuals vary with regard to anxiety or overconfident behaviours. Eating nuts from shells is safest to reduce the risk of cross-contamination, where possible. Eating out of the home or specific controlled environments remains higher risk and is to be discouraged.
	Nutritional benefit especially in cases of multiple food allergy or in vegetarian families.	Other family member/s may have contrasting food exclusions. More expensive than exclusion and certain nuts may be a luxury item or not easily available for regular intake.
	Maintenance of tolerance of relevant nut.	Should only be considered if the child and family commit to at least weekly consumption of the selected nut/s.
For the healthcare professional	Potential to prevent other nut allergies or to promote cross-tolerance between related nuts, for example cashew and pistachio, walnut and pecan.	Selective nut eating is not advocated for fussy eaters or ambivalent carers.
	Ability to offer some options for improved QoL and nutrition for selected families.	Impact on service or increased demand for hospital-supervised food challenges needs to be assessed and managed.

A: AVOIDANCE (COMPLETE OR SELECTIVE?) AND APPLICABILITY OF ADVICE

Children who have an allergy to one type of nut or peanuts are more likely to be allergic, or to become allergic to other nuts. Thirty per cent (1 in 3) of nut-allergic people will react to more than one type of nut.⁶ Given these cross-reactivities between groups of allergenic food, particularly tree nuts and peanuts, and the potential for contamination during the food-manufacturing process, complete peanut and tree nut avoidance is an understandable option.

The dual-allergen exposure hypothesis challenges this. It suggests that early environmental exposure to food protein through a disrupted skin barrier leads to allergic sensitisation, whereas early oral exposure to food allergen induces tolerance.⁷ This hypothesis has now been tested under stringent randomised controlled trial (RCT) conditions and the findings have led to changes in practice. Recent evidence for PA prevention from the LEAP data⁷ and the Enquiring About Tolerance⁸ study has resulted in a shift in the approach to weaning onto solids, and it is now accepted that there is a 'window of opportunity' for oral tolerance induction. These studies have resulted in changes to public-health policy globally: rather than avoiding peanuts, early introduction of peanut protein in infants at high risk of PA (those with severe atopic dermatitis and/or egg allergy) is now actively recommended by the World Allergy Organisation (WAO), the Australasian Society of Allergy and Clinical Immunology (ASCI) and the US National Institutes for Health (NIH) for the prevention of PA.

There is also a growing body of evidence on the safety and benefits of selective nut eating. Brough et al in 2015 stated:

'In peanut or tree nut allergic children, introduction of specific nuts to which the child is not allergic may improve quality of life and should be considered in patients with multiple food allergies, vegan or ethnic-

specific diets, in whom nuts are an important source of protein.'⁹

This approach may also promote improved nutrition in areas of the world afflicted by malnutrition and obesity. When adopting such an approach it is important to consider safety. Allergy testing by skin-prick test (SPT) and/or sptIgE, should be conducted prior to introducing any new nuts. Consideration should also be given to conducting oral food challenges under medical supervision where low-level sensitisation indicates this. Unless and until a patient has been tested for specific nuts and assessed by an expert clinician, it is still safest to advocate complete nut avoidance. It is also useful to be aware of common cross-reactivities, such as between cashew and pistachio, walnut and pecan. These associations can also help the clinician guide appropriate nut avoidance.

While selective nut eating is gaining momentum and has potential for significant benefit, it is important to note that there are associated risks and challenges. Table I summarises many of these.

B: BETTER LABELLING AND INFORMATION

FOOD LABELLING

Understanding food labels is key to making safe choices. For example, peanut may also be known or listed as: *Arachis hypogaea*, beer nuts, cacahuete, chinese nuts, earth nuts, groundnuts, goober nut/pea, mandelonas or monkey nuts. Food-allergic individuals should be given written information regarding the specific foods they are allergic to, with all the possible names they could be referred to by.

Many nut-allergic patients are concerned by foods which are not related to peanuts or tree nuts but which, nevertheless contain the word 'nut': chestnut, water chestnut, coconut,

palm nuts, nutmeg (mace) and butternut squash need not be avoided unless they are known to cause a clinical reaction.

REGULATION

Common food allergens must be listed in the ingredients list of manufactured foods although the list of common allergens varies between countries: 14 allergens in the United Kingdom and eight in the United States. South African regulations relating to the labelling and advertising of foodstuffs were updated to mandate that allergens (gluten, milk, eggs, soya, peanuts and tree nuts, shellfish or crustaceans) or significant cereals (wheat, rye, barley, oats and triticale – a cross between wheat and rye) must be indicated on food labels. Additives such as Tartrazine (E 102 or Yellow No 5), monosodium glutamate (MSG), sulphur dioxide and related compounds (sodium sulphite, sodium bisulphite, hydrogen sulphites and metabisulphites) must also be declared on labels. Uncommon allergens, namely those not classified in the common allergen category, must be disclosed by manufacturers upon request by a consumer, inspector or the Department of Health.¹⁰

European Union (EU) food-labelling laws, which continue to cover UK policy to date, also require that labels must state clearly whether tree nuts, peanuts, lupin (a legume which may cross-react with peanut used for flour, especially in French baking) and sesame, as well as other common allergens, are ingredients in a food product.¹¹ This mandatory disclosure has applied to all pre-packaged food since December 2014. The laws also stipulate that any products that contain peanut (even if an alternative name for peanut is used) should use the term 'peanut' on the ingredient label and those containing tree nuts should list each type of nut (e.g. cashew, walnut, almond). The regulations also apply to foods sold in restaurants and takeaways and 'loose' (without packaging), such as from a bakery, delicatessen, butcher or café, as well as foods packed for direct sale (e.g. sandwich bars, market stalls and some catering products). Since the implementation of these laws, there has been an acknowledged improvement in better visibility of declared allergenic ingredients.

PRECAUTIONARY ALLERGEN LABELLING (PAL)

These warnings, represented in excessively variable wordings, are used by food manufacturers to highlight a possible risk of an otherwise nut-free product being accidentally contaminated by nuts during manufacturing. There is currently no law to say how or when this type of labelling should be used but it appears on a wide variety of products. This is a complex area and the subject of ongoing work in which dialogue between the food industry, regulatory bodies, patient and consumer organisations, and healthcare providers is required so that clear consistent and reliable labelling may be developed.

It is important to note that PAL is not compulsory and

therefore one cannot assume the product is free from the relevant ingredient. Cross-contamination remains a risk, and this risk is magnified when eating out.¹⁰ While the advice remains: always check the precautionary allergen labelling, Brough and Turner et al, in their 2015 paper, 'Dietary management of peanut and tree nut allergy: What exactly should patients avoid?', note that although the published rate of peanut contamination in 'snack' foods with PAL ranges from 0.9–32.4%, peanut contamination in non-snack items with PAL is far less common. They propose that in some peanut-allergic patients (depending on history of reactivity to trace levels of peanut, reaction severity, other medical conditions, willingness to always carry adrenaline, etc), consideration may be given to allow the consumption of non-snack foods containing PAL following discussion with the patient's (and their family's) specialist.⁹

REACTION THRESHOLDS

Several studies are underway to establish reaction thresholds for clinical guidance, allergen testing and regulatory standards. The Integrated Approaches to Food Allergen and Allergy Management (iFAAM) study¹² is the follow-on study to the EuroPrevall¹³ birth cohort study (within EuroPrevall, the development of food allergies in the first two years of life was assessed and clues were identified as to why some children develop food allergies and others do not). This EU-funded academic/clinical/industry collaboration also aims to develop a clinically validated tiered risk assessment and evidence-based risk-management approach for food allergens for allergens in the food chain.

Studies such as iFAAM and the TRACE study¹⁴ have assessed the eliciting (reaction) dose for peanut-allergic patients, using food challenges where peanut-allergic individuals eat incremental doses of peanut under strict medical supervision. While eliciting doses provide useful information, this is complicated by key factors which may impact an allergic individual's reaction threshold at a given allergen exposure. These include exercise, illness, alcohol consumption, menstruation, seasonal pollens, the food matrix or method of cooking or processing.

In 2014, the Voluntary Incidental Trace Allergen Labelling (VITAL) project proposed a risk-based labelling system with allergen reference doses for precautionary labelling.¹⁵ This work and that of the International Life Sciences Institute;¹⁶ and the TRACE studies are providing ongoing insight into the way forward for a single-dose challenge for individual threshold information. The TRACE study is due for publication this year.

Eating out presents particular challenges for food-allergic individuals related to variable allergen management, education and communication along the chain. Up to one-third of accidental ingestions occur when eating in

restaurants and another 13–23% occur in other eating-out environments, such as school canteens.¹⁷ Legislators and food-providers need guidance to provide clear allergen information via trained and pro-active allergen-aware staff to improve confidence in eating-out choices.¹⁸

Key messages for patients, however, remain the same:

- always be vigilant when food is around;
- check food labels;
- be proactive when eating out;
- carry prescribed medication everywhere;
- learn how and when to use your adrenaline auto-injector (with a view to earlier recognition of symptoms);
- ensure that asthma is well managed.

For selective nut eating, it is strongly recommended to do so at home to better control any risk of cross-contamination. Eating nuts from the shells avoids the risk of cross-contamination from other nuts. Patients and their carers will need guidance to recognise foods where the risk of cross-contamination is particularly high. These include African and Asian dishes, baked goods (e.g. pastries, cookies, crackers, bread) and confectionary. It is also important to inform families that the selected nuts should be eaten regularly; long periods of avoidance of a select nut may result in new onset allergy, particularly if children showed low-level sensitisation before introducing specific nuts.

The food-allergic patient should have an individualised Allergy Action Plan. Most UK centres use the British Society of Allergy and Clinical Immunology's plans, available online in several versions tailored to the relevant adrenalin device prescribed (see <http://www.bsaci.org/about/download-paediatric-allergy-action-plans>). In South Africa, an action plan is freely available via the Allergy Foundation of South Africa website.

EDUCATING HEALTHCARE PROFESSIONALS

For healthcare professionals operating in the rapidly changing allergy landscape, continuing medical education is essential. Standard IgE tests or SPTs may be positive to more than one nut due to cross-reactivity (allergens common to several nuts), or co-sensitivity (frequently associated positive test results without true cross-reactivity) and evidence of clinical reactivity is advisable before advocating sustained avoidance. Component testing facilitates decision-making to differentiate between the likelihood of direct allergy vs pollen cross-sensitisation.¹⁹

C: CONSIDER CHALLENGE, CLINICAL CONTEXT AND CURRENT PRACTICAL ADVICE

The decision whether to consider nut avoidance or selective nut eating is often best undertaken through medical supervision through an oral food challenge. Sensitisation to peanut alone is insufficient for a diagnosis of PA in most, and conducting an oral food challenge in these children

is advisable, providing the family are willing to introduce peanut protein to their diet regularly (2–3 times a week) after the challenge.

Once peanut or tree nut allergy is confirmed, the patient and family should receive a dietary review and preferably a referral to a dietitian for nutritional assessment and advice on the appropriate avoidance and substitution. Patients receive a burden of new information, and best practice is to provide written information for reference and to signpost additional appropriate information. This may come via local hospital trusts, national and international allergy or dietetic societies, health departments and patient-support organisations.

SELECTIVE NUT EATING

The Pronuts study based at King's College London University, led by Dr Helen Brough with Prof G Lack, evaluated whether in children who already have one nut allergy, the introduction of nuts and seeds to which they are not allergic may prevent the development of new nut allergies. The feasibility of performing challenges to several nuts and seeds, and the introduction of the safe nuts and seeds into the diet on a regular basis was assessed. The definitive results of the randomised controlled trial await publication. The existing Pronuts study work has helped to inform the dietary advice on eating certain 'safe' nuts for children with a known nut-allergy.²⁰ Selective nut consumption should only be considered if the child and family are committed to a regular intake of the relevant nut/s 2-3 times a week. The LEAP study used 2g peanut protein 3 times a week,³ but no amounts have been validated for the tree nuts as yet. The main points are summarised as:

- Ensure that your child's emergency medicine is in date and easily accessible.
- Only offer your child the nut(s) that they tolerate when in your own home.
- When out of the house (at school, visiting family, in a restaurant or at a party), it is advisable that your child avoids all nuts due to risk of cross-contamination and possible confusion about identifying different nuts.
- Offer the tolerated nuts in pure form only, for example cracked from the shell or from a single nut pack (whole nuts rather than ground). Avoid if in processed foods, such as bread, cakes, biscuits, cereal bars or chocolate, due to the increased risk of cross-contamination with other nuts to which the child may be allergic.
- Nut oils: neutralised, bleached, deodorised (NBD) peanut oil will not cause allergic reactions for the majority of peanut-allergic individuals due to the negligible protein content but this is not the case with cold-pressed or unrefined oils, which should be avoided.
- Discuss your approach to 'May Contain Nut' products with your dietitian or your allergy team for specific advice for your child.

Detailed advice on precautionary allergen labelling and education on how to read the label, with practical tips is given in an additional resource available to members of the British Dietetics Association, written by the Food Allergy and Intolerance Group (FAIG) called 'Peanut and Tree Nut Allergy: Dietary Advice for Adults, Young People, Parents and Carers'.²¹

CHOOSING SAFE FOODS

It is known that food-allergic consumers take longer to shop due to reading labels and that this has a significant impact on QoL.²² New tools to assist safe food choices are available or are being developed and this offers the patient options for food choices, improves self-care and allows specialist dietitians' time to focus on more on personalised information.

DIGITAL ALLERGEN INFORMATION TOOLS

Food ingredient platforms or digital applications to aid buying safe foods are increasing in number and improving in quality. Allergy consumers are enabled to set up their own allergy profile and dietary requirements and, when the pre-packaged food's barcode is scanned, a symbol indicates instantly if the food is likely to be a safe choice, based on the labelling supplied by the manufacturer, and with extra product or recall notes if available. These systems vary and patients should be advised to choose a system that is regularly and automatically updated when there is a change in the recipe. Those systems with clinical backing are to be favoured, and in the United Kingdom there are leading apps supported by dietetic and allergy clinicians, as well as patient support groups. Validation work looking at these is in process and major allergy bodies will be reviewing apps over time to offer the best recommendations for patients and their families.

Most recently and controversially, patient-held food-allergen detection systems are being developed and publicised. The commercial sensor uses the chemistry used to make all allergen detection possible, equivalent to those used by many allergen test-kit companies, namely, a special immunoassay called a 'Lateral Flow Device'. The concern with these kits is that they can only, even if appropriately used and accurate, test the small area of food inserted into the device at the table. As most food is not a homogenous mixture of allergens and ingredients, especially with nut-containing foods, the pitfalls are self-explanatory. Concerns include permitting a false sense of security with a negative test which could result in the individual experiencing a severe allergic reaction, and false positives or unvalidated thresholds leading to confusion. For now these systems cannot be safely recommended to allergy patients at risk of immediate reactions.

Finally, depending on the tastes, priorities, resources, baseline level of experience of allergic reactions and anxiety related to the potential risks of the patient and family

in question, managing the practical aspects of selective nut eating may not represent an improvement in QoL, even when counterbalanced with the hope of maintained tolerance to the specific nut. Decision regarding selective nut eating should be reviewed regularly and patients are advised to avoid a nut if not eaten for more than six months, due to the risk of having developed that nut allergy, unless specifically reassessed.

It remains to be proven whether selective nut eating reduces the rate of other nut allergies or promotes cross-tolerance or if clearer advice on reaction thresholds of specific foods and improved food-ingredient awareness through better labelling will lead to a better patient experience and fewer reactions. We eagerly await the results of the studies mentioned that are due to be published soon.

CONCLUSION

The impact of the diagnosis of food allergy permeates many aspects of the life of a patient, their family and society. Depending on the age, when nut allergy is diagnosed, safe nuts can be introduced into the diet if there are clear guidelines given for safe eating and management of accidental reactions. While evidence for best practice is growing, it is the allergy clinician's duty to best assess the safety, feasibility and factors likely to influence QoL in each patient's case.

This necessitates a multidisciplinary approach and specific education around food ingredients and labelling, involving specialised medical and dietetic personnel, as well as parents and schools. Optimising QoL through the promotion of better food labelling and an active approach to safer, broader food choices makes the active management of allergy, aiming at maintenance of tolerance, an area of growing interest for patients and allergy-aware clinicians.

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DECLARATION OF CONFLICT OF INTERESTS

Lauri-Ann Van der Poel co-developed Foodmaestro, a digital ingredients platform with an app of the same name, and is a currently a shareholder.

Helen Fisher has no conflict of interest to declare.

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