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Food Allergy (M Fernández-Rivas, Section Editor)

Nutritional Management of Children with Food Allergies

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Abstract

Purpose of the Review The purpose of the review is to review the evidence for the nutritional management of paediatric food allergy and provide a practical approach for healthcare professionals working in this area.

Recent Findings Dietary elimination remains the mainstay for management of food allergies in children. However, the elimination of food allergens increases the risk for growth faltering, micronutrient deficiencies and feeding difficulties. Breastmilk remains the ideal source of nutrition for infants, but when not available, the vast majority will tolerate an extensively hydrolysed formula, and rice hydrolysate has also been suggested as a suitable alternative. Only in severe cases, including anaphylaxis, eosinophilic oesophagitis and growth faltering, is an amino acid formula indicated. The early introduction of peanut and egg and avoiding the delay in the introduction of other allergens, when not already allergic, has been highlighted by recent studies.

Summary Whilst the elimination of allergens increases the risk of developing poor growth, micronutrient deficiencies and feeding difficulties, optimal, early dietary input, including advice on active introduction of allergens and alternative feeds, ideally from a registered dietitian/nutritionist, may be prevent and improve outcomes.

Introduction

The prevalence of challenge proven food allergies in children varies greatly between countries and can be below 1 % in some countries and up to 10% in others [1]. Whilst higher rates of food allergies are generally seen in developed countries [2], emerging data indicates an increase in food allergy in developing countries, including China, India and South Africa [3–5]. This prevalence data reflects mostly challenge-proven immunoglobulin E (IgE)-mediated food allergies. The true prevalence of non-IgE-mediated allergies has been poorly studied [1]. The EuroPrevall study investigating the prevalence of cow's milk allergy [6] found that 23.6% of their paediatric cohort with challenge proven CMA had non-IgE-mediated CMA, with more than half of the cow's milk allergic children from the UK presenting with this delayed allergy. Whilst only 10% of countries have prevalence data on challenge-proven food allergy and limited prevalence data on non-IgE-mediated allergy exists, the burden of food allergy in paediatrics for the child and their family and the healthcare system has been universally well recognized [2].

The mainstay of management for food allergy remains the elimination of the offending allergens [7]. In the young, food elimination and avoidance can pose a nutritional risk, as the most common food allergens, including cow's milk, hen's egg, wheat, soya, fish, peanuts and tree nuts, contribute important nutrients for growth and development [8]. Below 2 years of age is also a critical time for the development of oral motor skills and a positive relationship with food [9].

Although many guidelines have been published on the dietary management of food allergic children [10, 11], it is clear that an individualized approach [7], under the guidance of a registered dietitian/nutritionist, is preferable to ensure optimal growth and micronutrient status [12]; avoid or manage feeding difficulties; provide guidance on complementary feeding, allergen reintroduction; and most significantly, improve quality of life for the child and their family. This publication focuses on the evidence base for the dietary management of paediatric food allergy and provides a practical approach for healthcare professionals working in this area.

Dietary Elimination

Dietary elimination must be individualized to the child's allergic symptoms and clinical diagnosis, based on a detailed allergy history alongside the interpretation of relevant allergy tests and where appropriate oral food challenge outcome [7, 13]. Comprehensive dietary advice should consider the individuals nutritional requirements, suitable and locally available food alternatives in addition to taking the cooking skills of the family into account [7, 14]. In addition, the carers should receive support on how to promote diet diversity, in particular during complementary feeding, and the long-term impact of diet on health and disease prevention should be included in the allergy-focused dietary consultation [15]. The common allergens provide essential macro- and micronutrients; therefore, when they are eliminated from the diet, an

alternative source of these nutrients is fundamental to ensuring nutritional adequacy (Table 1).

Whilst allergies to egg, milk, soy and wheat may resolve overtime [17–20], allergies to peanut, tree nuts and sesame and fish are more likely to persist [21]. Therefore, regular review of the both allergy presentation and status is important to ensure management and dietary avoidance is appropriate, unnecessary eliminations are avoided, and the diet is as diverse as possible.

Level of elimination

For egg and milk, complete avoidance of all forms may not always be necessary. Baked forms of both food allergens may be tolerated in up to 70% of milk and egg allergic children allowing an expansion of their diet and an improvement in quality of life [22–26]. Extensive heating, such as occurs during baking, decreases protein allergenicity by denaturing the conformational epitopes present within the food. Baked forms of both egg and milk include individual muffins, cakes and rolls baked at 180° for 25–30 min within a wheat or carbohydrate complex, ensuring that the centre of the individual baked product is completely cooked and not wet or soggy in the middle. Since the introduction of baked forms does not come without risk [27], these forms of the allergens should be introduced with guidance and support from allergy specialists.

Peanut and tree nut allergies tend not to be outgrown, with between 9 and 20% of those allergic to any nut developing tolerance over time [21]. Peanut and tree nut allergy can exist together as can allergy to multiple tree nuts (e.g. cashew and pistachio often co-exist as do walnut and pecan) [28]. However, the reported rate of co-existent allergy is variable dependent upon the population studied (age and ethnicity), the number of nuts studied and the effect of pollen allergy and the methodology used in the study, i.e. oral food challenge proven allergy versus specific IgE and clinical history alone [28]. Avoidance of all peanuts and tree nuts has been the traditional approach to dietary management of peanut and tree nut allergy, and whilst this is the safest approach, it is not always simple and affects quality of life [29, 30]. More recently, a personalized approach to include the individual nuts to which the person is not allergic has been suggested [31, 32]. This may be helpful to families where specific nuts are a commonly eaten food or in certain dietary practices, e.g. vegan and vegetarian diets, but carers do need advice on how to safely do this.

Age-appropriate and detailed education on understanding food labels, which may differ between countries, and identifying hidden allergens in food, in an easy to understand and accessible format which supports individual decision-making and risk assessment, is vital to allergen avoidance. Precautionary allergen labelling (PAL) including statements such as "May contain" or "Produced in the same facility" are often difficult for families to interpret and understand in relation to whether a food item is "safe" to consume [33]. Recently, the Global Allergy and Asthma European Network (GA(2) LEN) guidelines [34] has proposed a voluntary threshold declaration of 0.5

Table 1 Nutrients provided by the common allergens and need to be considered when the food allergen is avoided due to food allergy (*Adapted from* Durban R, Groetch M, Meyer R, Coleman S, et al. Dietary Management of Food Allergy. Immunology and Allergy Clinics of North America 2021; 41(2):233–270, with permission)

Food allergen	Protein	Carbohydrate	Fat	Fibre	Calcium	Vitamin D[1]	Vitamin A	Vitamin B12[2]	Riboflavin (B2)	Folate	Iodine[3]	Iron	Zinc	Omega 3 fatty acids
Cow's milk	X	X	X		X	X (Only fortified)	X		X		X			
Hen's Egg	X		X			X	X	X	X	X	X	X		
Peanut	X		X	X								X	X	
Tree nuts[4]	X		X	X	X[4a](e.g. almond, hazelnuts and walnuts)							X	X	X[4a/5]
Fish	X				X (fish bones, e.g. sardines)	X (oily fish)	X (oily fish)	X			X			X (oily fish)
Shellfish	X					X	X	X			X		X	X[6](less than oily fish)
Wheat		X		X	X (if fortified, e.g. bread)			Some breakfast cereals If fortified	X	X (if product fortified)		X	X (wholegrain varieties)	
Soya	X			X	X							X	X	X[5]
Sesame	X		X		X								X	X[5]
Legumes	X	X		X	X (beans)				X	X		X	X	

[1]It is difficult to obtain enough vitamin D from the diet alone

[2]Diets free from animal products require a vitamin B12 supplement

[3]When cow's milk, fish and eggs are avoided an iodine supplement may be required

[4]Nutrient content of tree nuts in general

[4a]Exact nutrient content varies according to nut variety

[5]Good source of alphalinolenic acid (ALA), but less effective source of eicosapentaenoic (EPA) and docosahexaenoic acid (DHA), which are related to health benefits [16]

[6]Main shellfish sources are mussels, oyster, squid, crab

mg/100 g for trace food allergen in processed food but acknowledges that this is not legally binding and is a first step towards this [35]. Therefore, a shared decision-making approach on how a family manages PAL on food labels forms an important component of food allergy patient education [33, 36].

Box 1 Summary points for dietary elimination

- Dietary elimination is the cornerstone of food allergy management
- Avoidance advice should be individualised based on a detailed allergy focussed history, interpretation of allergy tests and where appropriate an oral food challenge
- Avoidance of the common allergens may cause specific nutritional deficiencies. Suitable, tolerated alternatives should be recommended to ensure nutritional adequacy
- Teaching children and their families about reading and interpreting food labels is essential to allergen avoidance
- A high proportion of young children allergic to egg and milk will tolerate baked forms of these allergens

The Role of Breastmilk and Specialist Formula in the Management of Food allergy

Breastmilk

Breastmilk is the ideal source of nutrition for children with food allergies and has many proven nutritive and non-nutritive benefits [37, 38]. This has also been recognized by all official allergy associations, who support breastfeeding in children with food allergies [11, 39–41], ideally in line with the World Health Organization guidelines [42].

The prevalence of food allergy symptoms in breastfed children remains a highly debated topic. Whilst it is known that breastmilk may contain food proteins derived from the maternal diet including cow's milk, peanut, egg and wheat, amounts present vary, and the clinical relevance is often questioned [43–46]. Most data has been generated around CMA. Høst et al. [47] found in a prospectively recruited cohort of breastfed children that 0.5% of the 2.2% children diagnosed with an IgE-mediated CMA presented whilst being exclusively breastfed. It is thought that this is due to the presence of β-lactoglobulin, a whey protein in cow's milk, which is not endogenously present in breastmilk. In one study of mothers of infants with suspected CMA, this whey protein increased from baseline up to 7.84 ng/mL 1 to 2 h after mothers consumed 400 mL of cow's milk. However, it was not detected in 25% of the women [48]. Overall, great variation in the amount of β-lactoglobulin detected in breast milk has been found ranging from 0 to 150 ng/ml [49, 50].

There is consensus that the presentation of IgE-mediated allergies in breastfed children is rare but is reportedly more common in

non-IgE-mediated allergy; however, evidence for this is limited [43]. Guideline documents reflect this and recommend a maternal elimination diet of suspected allergens (i.e. most commonly cow's milk, but can also include soya, egg and wheat) only if symptos appear whilst breastfeeding. Re-introduction of the allergen should occur between 2 and 4 weeks after the elimination to confirm or refute the allergy, to avoid unnecessary elimination of allergens that also contribute important nutrients to the maternal diet (Fig. 1) [39, 43, 51].

Formulas for the management of CMA

A formula for the management of CMA is required by both the American Academy of Pediatrics and the European Academy for Allergy and Clinical Immunology to be tolerated by at least 90% of infants with a double-blind, placebo-controlled challenge proven CMA with a 95% confidence interval [52, 53].

These formulas should only be recommended in infants where breastmilk is insufficient or not available. They are categorized into three primary categories (Fig. 1): extensively hydrolysed formulas (EHFs) based on whey or casein, amino acid-based formulas (totally free from cow's milk and other allergens) and non-cow's milk-based formulas (hydrolysed rice or soy protein-based).

Extensively hydrolysed formulas [54]

EHFs have been available since the 1960s and are produced by the enzymatic hydrolysis of whey and/or casein proteins, resulting in low molecular weight peptides, which significantly reduces the allergenic potential

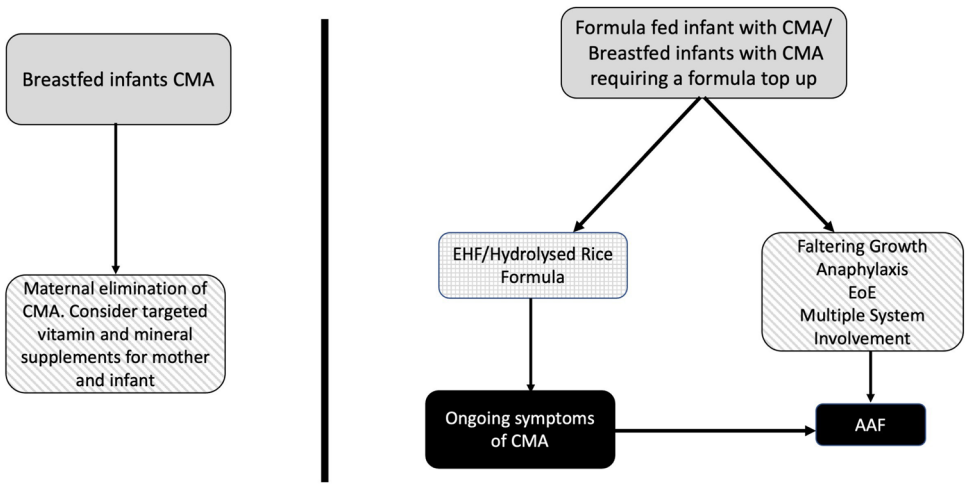

Fig. 1 Summary of breastmilk and formulas for the management of CMA

of the protein [55]. Nutritional composition of these formulas are very similar and are required to comply with EU guidelines in regard to macro- and micronutrients and ensure normal growth and development. The formulas differ primarily with the addition of pre, pro and synbiotics, varying levels of medium chain triglycerides and inclusion of lactose as part of the carbohydrate source. In 2012, the European Societies for Pediatric Gastroenterology, Hepatology and Nutrition concluded that EHF with lactose are safe and effective in the management of CMA with some evidence of its positive impact on the gut microbiome and palatability as perceived by adult taste trials [39]. The addition of pre- and pro-biotics, and more recently synbiotics, to EHF for the management of CMA has received a lot attention. Whilst a significant number of papers have been published, highlighting the potential impact on the improvement in stool microbiota [56], increasing the rate of cow's milk tolerance [57], reduction of allergic co-morbidities and functional gastrointestinal disorder [58, 59], no current guidelines make any specific recommendation for or against these additions. Based on studies, most children with CMA will tolerate an EHF as first-line formula, which is also recommended by most food allergy guidelines [10, 11, 39, 41, 51].

Amino acid-based formulas (AAF)

AAF provide protein only in the form of free amino acids. Their use is indicated in infants and children with severe CMA. Similar to EHFs, AAF also have to comply with guidelines on composition and effectively support growth and development [60]. In recent years, a synbiotic blend has been added to one brand of AAF. Although studies are promising in regard to normalizing the microbiota [61], more in line with breastfed infants and requiring less hospitalization due to infections, no difference was found in the development of tolerance of cow's milk [62]. As with EHF, no guidelines make any recommendations for against these additions [10, 11, 39, 41, 51].

The indications for an AAF as first-line treatment have been assessed by two review publications. One in 2007 and more recently by Meyer et al. (2017) [63, 64]. Both publications have reported a higher prevalence of EHF failure reported in non-IgE-mediated food allergic conditions affecting the gastrointestinal tract. Additionally, Meyer et al. found that, when compared to EHF, some studies have indicated better longitudinal growth in infants on an AAF [65, 66]. This is reflected in some of the guidelines [41].

Based on this review in the following conditions, an AAF should be considered (Fig. 1):

- Symptoms not fully resolved on EHF
- Anaphylaxis to cow's milk protein
- Eosinophilic oesophagitis (EoE)
- Faltering growth in particular with multisystem involvement (gastrointestinal tract/and or eczema) and multiple food eliminations

Soy-based formula

Soy-based formulas currently on the market are made from soy protein isolate and have to conform to with macro- and micronutrient guidelines similar to other formulas. Unlike EHF or AAF, soy-based formulas are not required to go through the hypoallergenicity testing [52, 53]. Studies have found that in children with IgE-mediated CMA allergy, soy-based formulae are more likely to be tolerated, whereas concomitant soya allergy in non-IgE-mediated CMA is reported to be higher [67, 68].

Most guidelines do not recommend this formula in children with CMA younger than 6 months of age due to the higher reported prevalence of concomitant soy allergy and the putative risk of early phytoestrogen exposure [51, 69–71]. However, after 6 months, soy-based formulas can be considered in particular due to lower cost and better palatability, which makes it a useful alternative in resource-poor settings [72].

Hydrolysed rice-based formula (HRF)

HRF formulas have been available for the management of CMA in selected countries for almost 20 years. These formulas must comply with EU regulations for their composition and are nutritionally complete. Whilst many of the available HRF have now gone undergone hypoallergenicity testing, data on nutritional adequacy is limited [73–76]. There are five studies that have investigated growth in children on HRF with CMA and except for the study by Savino et al. [77], who used a HRF with lower protein content; all others have demonstrated good growth [78]. In 2010, the Diagnosis and Rationale for Action against Cow's Milk Allergy (DRACMA) guidelines suggested HRF as a suitable first choice for management of CMA when available because of their palatability and lower cost [51].

As rice drinks (not to be confused with HRF) and many rice products have been shown to be high in inorganic arsenic [79, 80], concern has been expressed about the arsenic content in HRF. However, both Meyer et al. [81] and Reche et al. [75] have analysed the levels of inorganic arsenic in a selection of rice-based formula and found that these levels fell below the safe limit (not taking into account varying inorganic arsenic levels in tap water) set by the European Food Safety Agency.

Other mammalian milks and plant-based drinks

Unmodified milks from other mammalian species (e.g. sheep, buffalo, goat milk) are unsuitable for the management of CMA as they have a high rate of possible allergenic cross-reactivity [51]. In some countries, less cross-reactive milks such as donkey, mare and camel milk have been used. Their use should only occur using fortified formulas in infants under guidance from a suitable healthcare professional [51, 82].

Plant-based drinks have increased in popularity in recent years. Whilst soy-based drinks have been on the market for more than 30 years, consumers now have the choice of almond, coconut, hazelnut, walnut, macadamia, quinoa, oat, hemp, potato, pea and rice-based drinks. There is variability in composition, compared with cow's milk and soy-based drinks, plant-based drinks usually have a low energy and lower or extremely low protein content [83]. The non-organic plant-based drinks are usually supplemented with calcium, with some also having increased protein and vitamin and mineral content. Despite this, they do not match the nutritional content of any formulas suitable for infants so should only be considered as a food ingredient after 6 months and a drink after 1 year of age, following a thorough dietary review to assess nutritional risk of deficiencies [8, 51, 83]

Box 2 Summary points for breast and formula feeding in infants with CMA

- Breastmilk is the ideal source of nutrition for all infants including those with CMA
- A maternal elimination diet should only be considered if symptoms appear whilst breastfeeding and the re-introduction of the allergen (s) should occur 2–4 weeks after elimination to confirm the allergy
- In the vast majority of children with CMA, an EHF will be well tolerated and lead to symptom improvement
- An AAF is indicated when an EHF is not tolerated, in anaphylaxis, faltering growth with multiple system involvement and in EoE
- HRF, where available can be used as an alternative for EHF and may be considered also as an alternative for AAF
- A soya formula should ideally not be used as first formula < 6 months of age, when other options are available and affordable

Complementary Feeding

Age of introduction of complementary food

Multiple randomized controlled trials (RCT) have assessed the early introduction of food allergens into the infant diet for prevention of food allergy [84–90]. These have led to changes in infant feeding guidance for allergy prevention with the majority advocating that introduction of common food allergens should not be delayed [91]. Two guidelines include specific advice for "higher-risk" infants: the definition of which varies to include infants with an atopic first-degree relative and/or the presence of eczema and/or presence of food allergy [92–94]. More often, allergen introduction guidance does not differentiate between higher and normal risk infants, with the advice that allergens should be introduced at the time of complementary feeding, which is between 4 and 6 months

or around 6 months of age, depending on the guideline [93, 95••, 96, 97]. The age of introduction of complementary food should also take into account local breastfeeding guidelines, which have often adopted the World Health Organization's (WHO) recommendation of exclusive breastfeeding until 6 months of age [98].

National Institute of Allergy and Infectious Disease (NIAID) guidelines are the only guideline to recommend allergy testing before introduction of peanut, recommending different approaches depending on risk [92]. For highest-risk infants (those infants with severe eczema, egg allergy or both), guidelines recommend the introduction of peanut between 4 and 6 months of age [92]. The British Society for Allergy and Clinical Immunology guidelines recommend that infants with eczema and/or existing food allergy may benefit from earlier introduction of cooked egg (and then peanut) alongside other solids from age 4 months [93]. The rationale for this is due to evidence that egg sensitisation may occur before peanut [93].

Early introduction of food allergens

How much and which format?

For egg and peanut, consumption of around 2 g of the allergen protein per week has been recommended [93, 95••]. This reflects a dose-response analysis of the EAT study data which showed that a mean weekly dose of 2 g of peanut or egg protein was highly protective (>80 % reduction) against peanut or egg allergy [90]. NIAID guidelines recommend higher intakes, as per the LEAP study (6 g peanut protein/week); however, this addendum guidance was published soon after LEAP when there was a lack of data to support alternative amounts [92]. A recent review by LEAP study co-investigators concludes that 2 g allergen protein is likely to be sufficiently protective to promote tolerance acquisition whilst being manageable for young children, particularly for those who may be incorporating multiple allergen foods [99].

Box 3 Summary points for the early introduction of peanut and egg

- Two gram allergen protein is equivalent to half a small, cooked egg and a heaped teaspoon of salt and sugar free peanut butter
- For peanut introduction, diluted smooth salt and sugar free peanut butter or peanut puffs can be used. Whole peanuts or chunks of peanut butter should be avoided due to risk of choking or inhalation
- For egg introduction, well-cooked egg, e.g. hard-boiled egg is recommended, while pasteurized/raw egg should be avoided as this was associated with increased risk of severe allergic reactions in some trials

Introduction of other food allergens

RCTs are lacking regarding introduction of other food allergens. The EAT study investigated introduction of multiple foods (egg, peanut, cow's milk, sesame, white fish and wheat) for allergy prevention in a general population [90]. Although that study did not show efficacy for allergy prevention for individual foods other than egg and peanut, it did report reduced allergic sensitisation in the intervention group. Fewer infants in the early introduction group had a positive SPT result (≥1 mm) to at least one of the study foods at 12 months of age compared to the standard introduction group (10.1% vs 17.3%) [90]. A recently published subgroup analysis from this study found that the risk of any food allergy in sensitised children was significantly reduced in the early-introduction group (EIG, 19.2%) compared to the standard introduction group (SIG, 34.2%; $p = 0.03$) [99]. This may provide some supportive evidence for early multiple allergen introduction, particularly in sensitized infants; however, adherence can be challenging highlighted in recent EAT study publications [100, 101•]. Guidelines suggest not to delay the introduction of any allergens (that a child is not allergic to) and to consider the family's usual diet when advising on introductions [92, 93, 95••].

Box 4 Practical summary points for complementary feeding in the infant with food allergies.

- Introduce complementary food around 6 months of age, not before 4 months (17 weeks)
- In high-risk infants (see definition above), consider the introduction of peanut (and egg) in countries where this allergy is prevalent
- Introduce vegetables, iron-rich proteins, fruit and cereals as part of first food introductions
- Progress to more textured foods from 6 months, including finger foods
- Follow local guidelines for vitamin D and other vitamin/mineral supplementation
- Avoid sugar and salt

Nutritional Risks in Food allergy

Growth

Many studies have highlighted an increased risk of growth faltering in children with food allergies [8]. In particular, short stature is more prevalent with around 10% of children having a height-for-age below −2 z-score [102–104]. The factors contributing towards poor growth are multifactorial and include the elimination diet itself which impacts on macro- and micronutrient intake [105], increased feeding difficulties in addition to co-morbidities (i.e. eczema and asthma) [106], ongoing

gastrointestinal inflammation [104] and medication, like corticosteroids may also impact on height growth [107].

Whilst the overarching management principles of ensuring optimal protein:energy ratio with micronutrients supportive of growth are the same as in other chronic conditions where growth is not optimal, these additional factors, that may impact on growth, need to be taken into account in food allergic children, highlighting the importance of the multi-disciplinary team [108].

Vitamin and mineral deficiencies

Managing food allergies in children involves the removal of one or more key food groups, increasing the risk of nutritional deficiencies. Meyer et al. analysed the diet diaries of 110 children with non-IgE-mediated allergy and illustrated that children were at risk of inadequate intakes of vitamin D, zinc, calcium and selenium; however, other micronutrients have also been implied [109–111]. Low serum biomarker levels of zinc, iron, selenium, vitamin D and calcium have also been found in children with food allergies [112, 113]. Additionally, a high risk of iodine deficiency was shown in infants under 2 years with CMA, especially in infants who were exclusively breast fed [114]. For infants and children with multiple allergies and children following a vegan diet, calcium, vitamin B12, vitamin A, vitamin D, iodine, zinc and iron intake should be assessed and supplemented if appropriate [115]. Particular attention should be paid to infants or young children not taking a formula milk [116].

Proton pump inhibitors (PPI), commonly used in paediatric practice, may also affect micronutrient status. Limited data exists on the risks associated with reduced absorption of micronutrients when an infant or child is taking a long-term PPI, although evidence of increased risk of fracture has been documented in children [117]. A reduction of gastric acid production potentially impacts on the absorption of calcium, phosphorus and vitamins such as B12 as well as iron [118].

It has been widely established that children who receive dietetic advice and monitoring are at significantly lower risk of nutrient deficiencies, particularly calcium and vitamin D [119]. Whilst there is no specific guidelines on the routine measurement of serum biomarkers for micronutrients in food allergic children, a detailed diet history may guide targeted nutritional bloods. The European Society for Paediatric Gastroenterology, Hepatology and Nutrition guidance on the accuracy of nutritional biomarkers is useful also for allergic children [120•].

Feeding difficulties

Infants with food allergy are often reported to experience feeding difficulties, ranging from texture hypersensitivity, bottle aversions to Avoidant

Restrictive Food Intake Disorder in older children [8]. The increased risk of developing feeding difficulties is thought to be multifactorial. The elimination diet itself, which may reduce the number of food introductions and variety of the diet, a traumatic event (i.e. food protein induced enterocolitis syndrome event or anaphylaxis), poor growth leading to compensatory feeding and the symptoms of food allergy which may lead to abdominal discomfort and pain are all possible contributory factors [121, 122].

Box 5 Summary points to reduce nutritional risk in food allergic children

- Involve a registered dietitian/nutritionist early in the management of food allergy
- Assess weight, length/height and < 2 years of age head circumference with every appointment and plot on appropriate growth charts
- Assess dietary intake and where required measure targeted nutritional biomarkers
- Infants who are breastfed need to be assessed for vitamin D and iodine supplementation
- Infants, who do not consume sufficient formula, may require a multivitamin and calcium supplement
- Provide feeding advice, including the expansion of texture and taste early on, to prevent feeding difficulties

Conclusion

The management of food allergies in infants and children is a complex and ever-changing field. The mainstay of treatment remains dietary elimination, and it is therefore essential that patients are reviewed by a registered dietitian/nutritionist. Removal of foods from a growing infant or child's diet can drastically affect nutrient intake: increasing the risk of growth faltering and feeding difficulties and nutritional deficiencies. Dietetic intervention should include teaching families to read labels, mitigate risks of cross contamination and provide written advice as appropriate. A thorough symptom and allergy history, alongside allergy testing (where appropriate), remain at the centre of practice with advice relating to increasing variety, texture and nutrients, with appropriate supplementation or serum monitoring as needed. A high proportion of children will tolerate baked milk and egg allowing expansion of the diet and should be considered where appropriate.

In CMA, breastmilk remains, where available, the ideal source of nutrition. Where insufficient or not available, the majority will tolerate an EHF or HRF; where available in an infants with severe CMA, an AAF may be needed.

The introduction of timely complementary foods is vital to promote oral feeding skills, increase nutritional intake and help facilitate the earlier introduction of allergens such as peanut and cooked egg and further introduction of all food groups within restrictions.

Declarations

Conflict of Interest
KW is a dietitian on the Learning Early about Peanut Allergy Trio Study which received research funding from the National Institute of Allergy and Infectious Diseases (NIAID, NIH), Food Allergy & Research Education (FARE), MRC & Asthma UK Centre, UK Department of Health through NIHR, National Peanut Board, and grants from UK Food Standards Agency. Consultancy for Aymes.

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NY: consultancy for Aymes

RM: honorarium for academic lectures from Abbott, Nestle, Mead Johnson, Nutricia/Danone. Nutritional board member for Abbott and CoMiss board member for Nestle Nutrition, consultancy for Abbott, Nutricia/Danone and Aymes.

Human and Animal Right and Informed Consent
This article does not contain any studies with human or animal subjects performed by any of the authors.

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• Of importance
•• Of major importance

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