



VERSION 2.0

CLINICAL ISSUES

Food

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ABBREVIATIONS

CFC	chlorofluorocarbon	LTRA	leukotriene receptor antagonist
COPD	chronic obstructive pulmonary disease	MBS	Medical Benefits Scheme
COX	cyclo-oxygenase	NHMRC	National Health and Medical Research Council
DXA	dual-energy X-ray absorptiometry	NIPPV	non-invasive positive pressure ventilation
ED	emergency department	NSAIDs	nonsteroidal anti-inflammatory drugs
EIB	exercise-induced bronchoconstriction	OCS	oral corticosteroids
FEV₁	forced expiratory volume over one second	OSA	obstructive sleep apnoea
FEV₆	forced expiratory volume over six seconds	PaCO	carbon dioxide partial pressure on blood gas analysis
FSANZ	Food Standards Australia and New Zealand	PaO	oxygen partial pressure on blood gas analysis
FVC	forced vital capacity	PBS	Pharmaceutical Benefits Scheme
GORD	gastro-oesophageal reflux disease	PEF	peak expiratory flow
HFA	formulated with hydrofluoroalkane propellant	pMDI	pressurised metered-dose inhaler or 'puffer'
ICS	inhaled corticosteroid	PPE	personal protective equipment
ICU	intensive care unit	SABA	short-acting beta ₂ -adrenergic receptor agonist
IgE	Immunoglobulin E	SAMA	short-acting muscarinic antagonist
IL	interleukin	SaO₂	oxygen saturation
IU	international units	SpO₂	peripheral capillary oxygen saturation measured by pulse oximetry
IV	intravenous	TGA	Therapeutic Goods Administration
LABA	long-acting beta ₂ -adrenergic receptor agonist		
LAMA	long-acting muscarinic antagonist		

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Food and asthma

Overview

There is emerging evidence that healthy eating may contribute to airway health.^{1, 2, 3}

IgE-mediated food allergies rarely trigger acute asthma.⁴

Asthma associated with intolerance to food chemicals (non-IgE-mediated reactions) may affect asthma in some individuals, but is probably rare.⁵ Risk depends on the type of food and the mechanism and degree of the individual's intolerance.⁵ Specialist investigation is usually necessary for accurate assessment and diagnosis, which often requires supervised elimination diets and challenge.

In this section

Healthy eating

Healthy eating for asthma

<http://www.asthmahandbook.org.au/clinical-issues/food/healthy-eating>

Allergy and intolerance

Food allergy and intolerance in asthma

<http://www.asthmahandbook.org.au/clinical-issues/food/allergy-intolerance>

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Healthy eating for asthma

Recommendations

Encourage healthy eating for all patients with asthma. Explain that there is emerging evidence that some healthy eating habits may also help with lung health:

- eating plenty of fruit and vegetables every day
- minimising intake of processed and take-away foods that are high in saturated fats.

► Go to: NHMRC's [Australian Dietary Guidelines](#)

How this recommendation was developed

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Wood *et al.* 2011¹
- Wood *et al.* 2012²

Do not routinely recommend dietary restrictions such as low-salt diets, or avoiding dairy foods or food additives, as strategies for managing asthma.

How this recommendation was developed

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Ardern and Ram, 2001³
- National Asthma Council Australia, 2012⁴
- Pogson *et al.* 2008⁵
- Zhou *et al.* 2012⁶

If patients are interested in trying food supplements to help manage their asthma, provide up-to-date information about evidence and explain that no dietary supplements have been shown to improve asthma.

Table. Effects of dietary strategies in asthma management

Please view and print this figure separately: <http://www.astmahandbook.org.au/table/show/56>

How this recommendation was developed

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available), with particular reference to the following source(s):

- Hasselmark *et al.* 1993⁷
- Paul *et al.* 2012⁸
- Pogson *et al.* 2008⁵
- Rowe and Camargo, 2008⁹

- Shaheen *et al.* 2007¹⁰
- Sur *et al.* 1993¹¹
- Thien *et al.* 2002¹²
- Wood *et al.* 2012²
- Welsh *et al.* 2010¹³

More information

Antioxidants and fats

For people with asthma, a diet high in antioxidant-rich foods (5 servings of vegetables and 2 servings of fruit every day) may help reduce the risk of asthma flare-ups and improve lung function, compared with a low-antioxidant diet (2 or fewer servings of vegetables and 1 serving of fruit per day).²

Fish oil supplementation does not appear to improve asthma control,¹² but there is limited evidence from very small studies that fish oil may help control exercise-induced bronchoconstriction.^{14, 15}

A high-fat diet may increase risk for poor asthma control by promoting inflammation, based on evidence from studies measuring inflammatory markers immediately after dietary challenge in adults with asthma:

- A meal high in saturated fats led to increased concentrations of sputum inflammatory markers and reduced efficacy of bronchodilator (salbutamol) 4 hours later, compared with a low-fat meal.¹
- A meal high in trans fats led to higher concentrations of sputum inflammatory markers than a meal with no trans fats.¹

Table. Effects of dietary strategies in asthma management

Please view and print this figure separately: <http://www.asthmahandbook.org.au/table/show/56>

► Go to: NHMRC's [Australian Dietary Guidelines](#)

Efficacy of dietary restrictions

A low-sodium diet does not appear to improve asthma control.¹⁶ Some small clinical trials have suggested that, in people with exercise-induced bronchoconstriction, a low-sodium diet might improve lung function after exercise, but the clinical importance of this is unknown.¹⁶

Overall, evidence from studies assessing links between the common food additive tartrazine (FSANZ number 102) does not show that tartrazine worsens asthma, or that avoiding tartrazine improves asthma for people without known sensitivity to tartrazine.³

There is not enough evidence to determine whether or not avoidance of monosodium glutamate (FSANZ number 621) affects asthma control.⁶

Eliminating dairy foods is not an effective strategy for improving asthma control in people without proven allergies to dairy foods, and could impair nutrition, growth or bone density.⁴ Food allergies rarely trigger asthma.¹⁷

Table. Effects of dietary strategies in asthma management

Please view and print this figure separately: <http://www.asthmahandbook.org.au/table/show/56>

► Go to: National Asthma Council Australia information paper [Asthma and Complementary Therapies](#)
 Go to: NHMRC's [Australian Dietary Guidelines](#)
 Go to: Food Standards Australia and New Zealand [list of food additives](#)

Magnesium supplements (oral)

Overall, evidence from randomised controlled clinical trials does not support routine use of long-term oral magnesium supplementation in the treatment of asthma.⁹

- A placebo-controlled clinical trial reported improvements in lung function and quality of life, compared with baseline, in adults with asthma who took oral magnesium supplements for 6.5 months. The intervention group showed improvement in quality of life and

asthma control compared with baseline, but the study did not report comparisons with placebo.¹⁸

- Another small clinical trial in adults reported that magnesium supplementation was associated with improvement in symptom scores, compared with placebo.¹⁹
- Another clinical trial in adults with asthma reported no benefit from 16 weeks' oral magnesium supplementation, compared with placebo.²⁰
- A small clinical trial in children reported that 2 months' treatment with oral magnesium was associated with reduced flare-ups compared with placebo, but did not affect lung function.²¹
- Another small clinical trial in children reported that 12 weeks' treatment with oral magnesium reduced reliever use, compared with placebo.²²

Note: IV and nebulised magnesium sulfate may be used in the management of acute asthma.

► See: [Managing acute asthma in adults and children](#)

Caffeine

Caffeine improves lung function in people with asthma for up to 4 hours.¹³ The main implication of this finding is that drinking coffee before a spirometry test may give a misleading result.

A meta-analysis found that it was not possible to conclude whether caffeine improves asthma symptoms.¹³ Some small studies have reported that caffeine improves exercise-induced bronchoconstriction.⁴ The dose needed to improve symptoms may be so high that it is associated with intolerable adverse effects (e.g. agitation, tremor, gastrointestinal upset, increased heart rate and blood pressure).¹³

Vitamin D

A causal relationship between vitamin D deficiency and asthma symptoms or poor asthma control has not been established.⁸ However, very limited evidence suggests vitamin D may be protective against flare-ups.⁸

A single small randomised controlled trial in children with newly diagnosed asthma who were sensitised only to house dust mite, reported that vitamin D supplementation reduced the risk of asthma flare-ups triggered by acute respiratory infections.²³ Another recent study failed to show any decrease in the rate of asthma flare-ups with vitamin D supplementation, although exploratory analysis of the results suggested that vitamin D supplementation reduced the rate of asthma flare-ups only in adults who had an increase in circulating vitamin D levels after supplementation.²⁴

Overall, there is not enough high-quality evidence to recommend routine vitamin D supplementation in asthma management.

Dietary effects on risk of developing asthma

Factors associated with reduced risk of developing asthma

In observational studies, various dietary factors have been associated with reduced asthma risk or better lung health, but causal links are unproven:

- A 'Mediterranean' diet (high in fish, fruits and vegetables) is associated with reduced risk of wheeze and asthma in childhood.²⁵
- Regular consumption of fish, especially oily fish, has been associated with lower risk of bronchial hyperresponsiveness or current asthma in Australian children^{26, 27}
- Children who reported eating fruit more than once a day had higher lung function than children who reported never eating fruit in a UK cross-sectional study.²⁸

Factors associated with increased risk of developing asthma

In observational studies, various dietary factors have been associated with increased asthma risk, but causal links are unproven:

- Consumption of fast foods has been associated with increased risk of developing asthma in children.^{29, 30, 31}
- A 'Westernised' diet has been associated with increased asthma risk, compared with an 'Asian' diet.³²
- High soft drink consumption has been associated with higher prevalence of asthma and COPD.³³
- Reduction in fresh fruit intake over a 7-year period has been associated with decline in lung function in adults.³⁴

Further research is needed to determine if these associations are due to causal links between food choices and asthma risk, and randomised controlled trials are needed to show whether changes in eating patterns can improve asthma control or reduce the risk of developing asthma.

► Go to: NHMRC's [Australian Dietary Guidelines](#)

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Food allergy and intolerance in asthma

Recommendations


Investigate food as a potential asthma trigger if patients report apparent links (e.g. asthma symptoms from suspected or repeated food reactions).

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).


If asthma symptoms appear to be triggered by intolerance to food or food additives, refer to a specialist for investigation if possible.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).


Explain to patients that elimination diets should only be conducted under supervision of a doctor or dietitian.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

Explain to patients that food allergy is commonly accompanied by asthma-like respiratory symptoms, but that food allergy is rarely the cause of chronic asthma.

 *How this recommendation was developed*

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

Correct any misconceptions patients may have about foods and asthma, including:

- dietary asthma triggers (e.g. explain that foods, and food additives other than sulphites, rarely trigger asthma symptoms)
- the roles of dietary supplementation or restriction in asthma management.

Table. Association between food chemicals and asthma

Food chemical	Sources	Association with asthma
Benzoates (food additives 211, 213, 213, 216, 218)	Common preservative in soft drinks and foods	Probably minimal

Food chemical	Sources	Association with asthma
<i>Monosodium glutamate (food additive 621) and naturally occurring</i>	Natural sources in fresh foods include tomatoes, various vegetables, mushrooms, fish, cheese, milk Added as flavour enhancer	Probably minimal
<i>Sulphites (food additives 221, 222, 223, 224, 225, 228)</i>	Common preservative used in processed foods, dried fruits, medicines, beer, wine	May trigger acute asthma (uncommon)
<i>Tartrazine (food additive 102)</i>	Colouring	Probably minimal
<i>Salicylates (naturally occurring)</i>	Stone fruits, berries, dried fruits, gherkins, concentrated tomato products, curry powder, paprika, thyme, garam masala, rosemary, tea	Probably minimal risk for people with aspirin-exacerbated respiratory disease

Sources

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Table. Effects of dietary strategies in asthma management

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How this recommendation was developed

Consensus

Based on clinical experience and expert opinion (informed by evidence, where available).

More information

Dietary triggers

Foods are rarely a trigger for asthma.¹

Food chemicals and additives

Sulphite additives (widely used as preservative and antioxidants in the food and pharmaceutical industries) have been associated with acute asthma.²

An estimated 3–10% of people with asthma are sensitised to sulphites.²

See also: Dietary salicylates

Wine

Wine has been documented to trigger asthma symptoms.³ The mechanism appears to be complex and varies between individuals.^{3, 4} Components of wine implicated in asthma reactions include sulphite additives and histamines.³

Although sensitivity to sulphites in wine has been demonstrated in individuals in clinical studies, this mechanism does not explain all asthmatic reactions to wine.^{3, 4, 5} The amount of sulphite in wine varies between brands. In general, there is more preservative in white wine than red wine, and more in cask wine than bottled wine.⁶

Some challenge studies suggest that antihistamines may reduce the severity of asthma symptoms due to wine.⁶ In general there is more histamine in red than white wines and more in Shiraz than Cabernet.⁶

► Go to: Australasian Society of Clinical Immunology and Allergy's patient information: [Alcohol allergy \(2010\)](#)

Thermal effects

Asthma symptoms provoked by cold drinks are commonly reported anecdotally. Asthma symptoms and a reduction in FEV₁ after drinking icy water have been observed in children with asthma.⁷ Increased bronchial hyperresponsiveness has been observed approximately 90 minutes after ingestion of ice.⁷

Dairy foods

Milk and other dairy foods do not increase mucus.⁸

Table. Association between food chemicals and asthma

Food chemical	Sources	Association with asthma
<i>Benzoates (food additives 211, 213, 213, 216, 218)</i>	Common preservative in soft drinks and foods	Probably minimal
<i>Monosodium glutamate (food additive 621) and naturally occurring</i>	Natural sources in fresh foods include tomatoes, various vegetables, mushrooms, fish, cheese, milk Added as flavour enhancer	Probably minimal
<i>Sulphites (food additives 221, 222, 223, 224, 225, 228)</i>	Common preservative used in processed foods, dried fruits, medicines, beer, wine	May trigger acute asthma (uncommon)
<i>Tartrazine (food additive 102)</i>	Colouring	Probably minimal
<i>Salicylates (naturally occurring)</i>	Stone fruits, berries, dried fruits, gherkins, concentrated tomato products, curry powder, paprika, thyme, garam masala, rosemary, tea	Probably minimal risk for people with aspirin-exacerbated respiratory disease

Sources

Ardern K, Ram FSF. Tartrazine exclusion for allergic asthma. *Cochrane Database Syst Rev* 2001; Issue 4. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000460/full>

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Dietary salicylates

Aspirin-exacerbated respiratory disease is a syndrome of airway inflammation that includes asthma, nasal polyposis, chronic rhinosinusitis, and reaction to NSAIDs. It can present with severe sudden-onset asthma. People with aspirin-exacerbated respiratory disease may react to one or more anti-inflammatory agent.

Salicylates are found in some foods (e.g. stone fruits, berries, dried fruits, gherkins, concentrated tomato products, curry powder, paprika, thyme, garam masala, rosemary, tea).⁹ Most foods that contain salicylates contain both salicylic acid and acetylsalicylic acid, and about one-third contain only acetylsalicylic acid.¹⁰ Dietary salicylates are generally thought not to cause symptoms in people with aspirin-exacerbated respiratory disease.¹¹

Salicylate elimination should only be considered under specialist supervision.

► Go to: National Asthma Council Australia's quick reference guide, [Aspirin/NSAID-intolerant asthma: pharmacy notes](#)

Elimination diets

Strict dietary elimination and spirometry measurement of FEV₁ after double-blind food chemical challenge is the most reliable method for detecting food chemical intolerance in people with asthma.¹² Positive responses (reduction in bronchial hyperresponsiveness) to placebo challenge are common during unmodified diets.¹²

For people with asthma and food intolerances, elimination diets do not always improve bronchial hyperresponsiveness.¹³

Salicylate elimination diets are controversial.^{11, 10} Salicylate elimination diets may put children at risk of nutritional deficiencies and eating disorders.¹¹

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