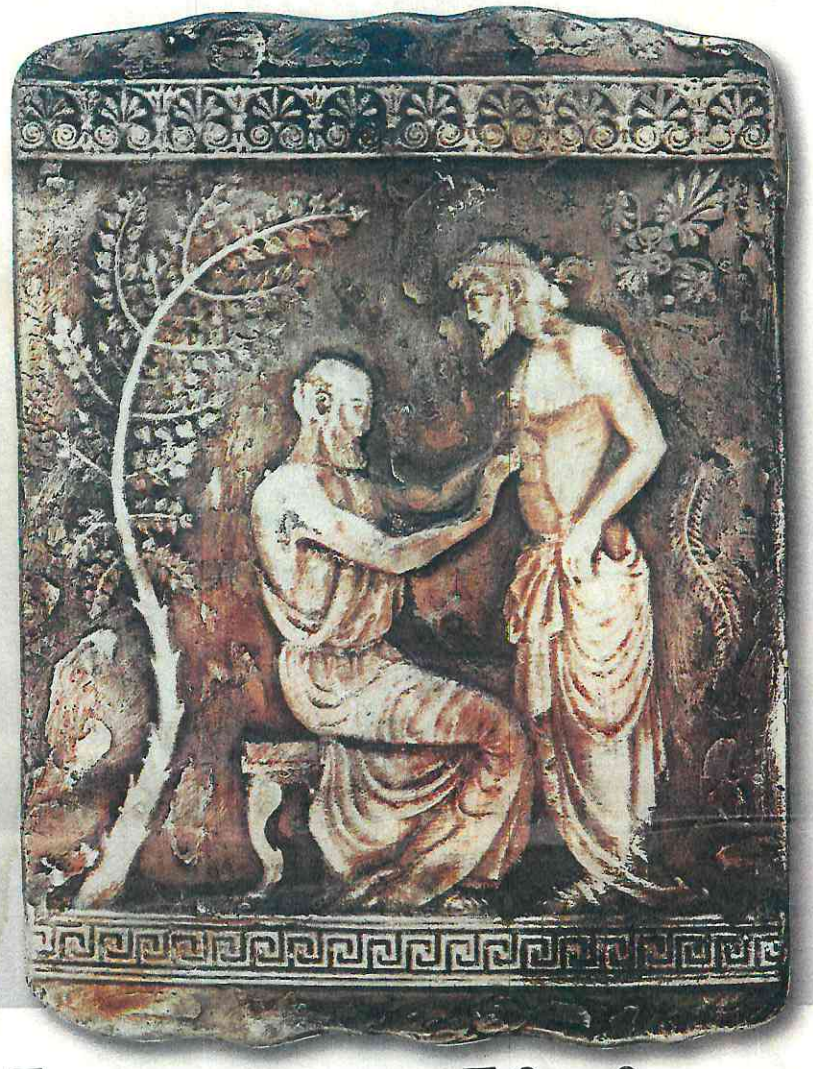

Food as medicine

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INTRODUCTION

WE HAVE known the impact of nutrition for centuries; the Greek physician Hippocrates II famously stated "let food be thy medicine and medicine be thy food" in around 400BC. Yet despite this knowledge, our food is becoming more processed and we are gaining weight.

The Australian Bureau of Statistics (ABS) reported that, in 2014/15, some 11.2 million (63%) Australian adults and around one in four (27.4%) of those aged 5-17 were overweight or obese.[1] The average weight of both men and women has increased by 4.4kg in the past 10 years.[1]

In a 2017 report on estimates of the health burden as a result of overweight and obesity, the AIHW highlighted the dramatic increase in chronic disease.

More than "11 million Australians (50%) reported having at least one chronic disease", including type 2 diabetes, cancer, COPD, cardiovascular disease, mental health disorders and musculoskeletal conditions.[2]

This increase in chronic disease has had an impact on mortality rates, with nine out of 10 deaths resulting from chronic disease.[2]

Figure 1 identifies the major risk factors for chronic disease: overweight and obesity (63%), inadequate fruit and vegetable consumption (95%) and inactivity or insufficient activity (56%).[2]

This How to Treat is part two of a two-part series. Part one explored exercise as medicine.

DIETARY TREATMENT AS MEDICATION

OVERWEIGHT and obesity refers to excessive fat accumulation generally developed from sustained energy imbalance where eating and drinking exceeds energy expenditure through physical activity.

It is being increasingly recognised worldwide that nutrition management has a significant impact on health. Dietary prescription alone can reduce and, in certain cases, remove the need for medications in common chronic health conditions.

Dietary advice provided by Accredited Practising Dietitians (APDs) is aimed at preventing and managing chronic disease as part of both primary and secondary prevention.

GP consultations offer an opportunity to provide lifestyle modification advice and referrals to allied health practitioners such as dietitians, exercise physiologists and physiotherapists.

A multidisciplinary approach to healthcare has been shown to be effective in improving patient health outcomes. In addition, advice from dietitians has been found to be more effective in long-term management than nutrition advice from GPs in reducing blood cholesterol levels.[3]

The combined care of a GP and dietitian is most effective in addressing weight management and hypertension compared with sole practitioner management with either a GP or dietitian.[4]

With one in four Australian children aged 5-17 being overweight or obese and an estimated 11.2 million ▸

INSIDE

overweight or obese adults, there is a role for allied health intervention to guide initial lifestyle and dietary changes.[1]

Data from established GPs in Australia reported that almost 10% of non-pharmacological clinical treatments were related to counselling or advice for nutrition/weight.[5]

A 2018 study of Australian GP registrar referrals to dietitians reported that only 0.26% of patients seen were referred to a dietitian/nutritionist, and of those referred, around 40% were related to chronic disease management (see figure 2 for common reasons for referral to a dietitian) plan.[5]

GP barriers to providing nutrition education include limited nutrition training, a lack of knowledge and skills in presenting the information, a lack of time, inadequate reimbursement and difficulty translating knowledge into practice.[6]

WEIGHT LOSS STRATEGIES

WEIGHT gain occurs when there is a mismatch between energy consumed and energy required for basal metabolic functioning plus variable activity/exercise requirements.

Hormones and inflammation can impact rate of weight gain and or lack of weight loss, and decrease basal metabolic rate to a small extent.

Energy deficiency states occur more commonly in developing countries while excess energy states are more common in developed nations.

Diet is generally more important than exercise for weight loss and optimal weight maintenance. One can easily 'out-eat' the most rigorous exercise regimen but it is hard/impossible to 'out-exercise' a poor energy dense diet.

While there are many approaches to weight loss, a common message appears to be 'eat more vegetables'.[7]

A healthy relationship with food is important as it prevents excessive restriction and binging.

Gradual and small lifestyle changes, rather than drastic dietary change, ensures long-term results as the patients do not get as overwhelmed and feel more confident.

Tracking discretionary foods (especially energy-dense beverages, processed foods and takeaways) and gradually reducing these teaches moderation and ensures long-term compliance. Top tips for weight loss appear in box 1.

FRUIT AND VEGETABLE INTAKE

WHEN assessing fruit and vegetable intake, it is important to understand what a 'serve' constitutes (see boxes 2 and 4).

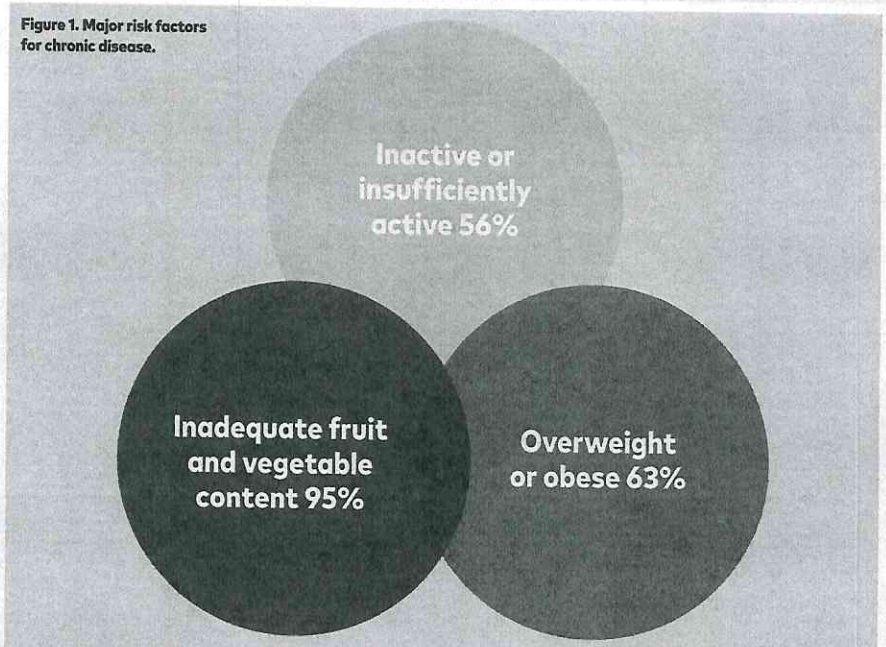
Fruit

Fruit provides vitamins, minerals and antioxidants that help the body function at a cellular level, boosts the immune system and provides fibre for optimal gut health (see box 3).[8]

Vegetables

There is strong evidence that for each serve of vegetables eaten each day, the risk of coronary heart disease is reduced even further. Also, by eating vegetables, especially colourful vegetables, there is a reduced risk of stroke and weight gain.[9]

Figure 1. Major risk factors for chronic disease.



Source: AIHW (2017) Impact of overweight and obesity as a risk factor for chronic condition[2]

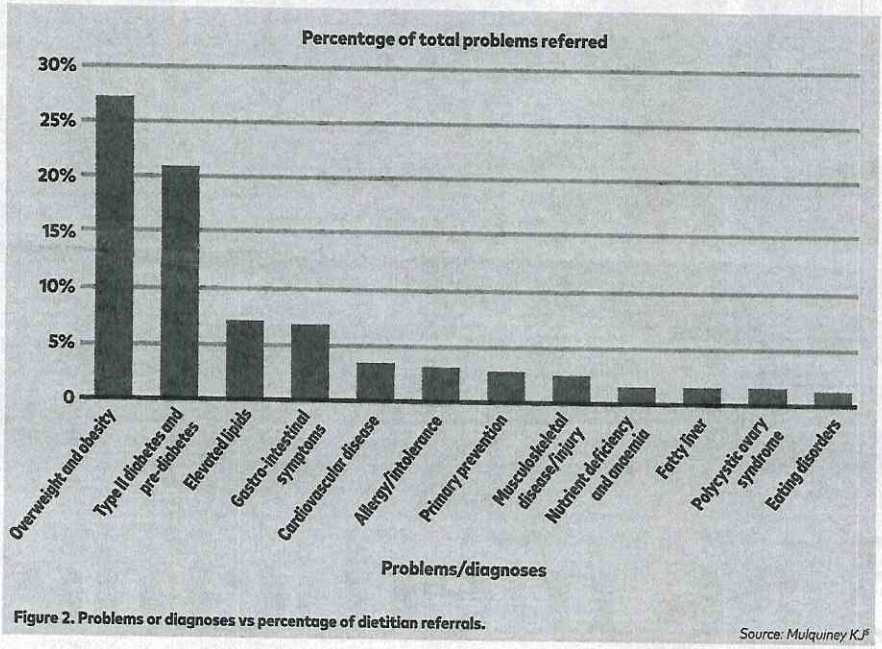


Figure 2. Problems or diagnoses vs percentage of dietitian referrals.

Source: Mulquiney KJ[5]

Table 1. Vegetable subgroups

Vegetable subgroups	Vegetables
Dark green or cruciferous/brassica	Broccoli, brussels sprouts, bok choy, cabbages, cauliflower, kale, lettuce, silverbeet, spinach, snow peas
Root/tubular/bulb vegetables	Potato, cassava, sweet potato, taro, carrots, beetroot, onions, shallots, garlic, bamboo shoots, swede, turnip
Legumes/beans	Red kidney beans, soybeans, lima beans, cannellini beans, chickpeas, lentils, split peas, tofu
Other	Tomato, celery, sprouts, zucchini, squash, avocado, capsicum, eggplant, mushrooms, cucumber, okra, pumpkin, green peas, green beans

in kilojoules, and a source of minerals and vitamins (such as magnesium, vitamin C and folate), dietary fibre and a range of phytochemicals, including carotenoids.

WHAT FOODS ARE INCLUDED IN THE VEGETABLE FOOD GROUP?

There are many different vegetables the year. Vegetables are derived from different parts of the plant, including the leaves, roots, tubers, flowers, stems, seeds and shoots.

Legumes are the seeds and are eaten in their immature form as green peas and beans, and the mature form as dried peas, beans, lentils and chickpeas.

sub-groups for vegetables appear in table 1.

Australians' fruit and vegetable intake

When it comes to fruit and vegetable intake, 51% of adults do not consume the recommended two serves of fruit daily and 66% of adults do not consume the recommended five serves of vegetables daily.[11]

There is a gender discrepancy in fruit and vegetable consumption, with 24% of women but only 15% of men meeting the recommendations, as illustrated by figure 3.[12]

According to the ABS in 2014/15, 49.8% of Australians 80 and over met the recommended two serves of fruit daily while only 7% met the recommended five daily serves of vegetables, and only 5% met both.

In those over 65, 8.1% met both fruit and vegetable recommendations, compared with 3.2% of 18-24-year-olds. On average, in 2014/15, men 18 years and over consumed 1.6 serves of fruit and 2.2 consumed 1.8 serves of fruit and 2.5 serves of vegetables daily, on average.[1]

WHAT CAN WE DO TO INCREASE FRUIT AND VEGETABLE INTAKE?

According to the 2011/12 National Nutrition and Physical Activity survey, breakfast was voted as the smallest meal of the day, followed by lunch, which consisted predominantly of meat/fish/poultry, grains and non-starchy vegetables.

The largest meal enjoyed by most Australians was dinner, where

Box 1. Top weight loss tips

- Aim for half of lunch and dinner to be made up of vegetables
- Keep carbohydrate content and protein content down to a quarter of the plate each
- Limit energy dense beverages (cordial, soft drink, sports drinks, juice, flavoured milk and in particular alcohol)
- Aim for two pieces of fruit per day
- Limit packaged/processed foods and takeaways
- Implement dietary changes gradually

Box 2. What equals one serve of fruit?

A serve of fruit is approximately 150g (350kJ), equivalent to:

- One medium piece of fruit, eg, an apple, banana, orange or pear
- Two small pieces of fruit, eg, apricots, kiwifruits or plums
- One cup of diced or canned fruit (no added sugar)

Source: Australian Government Department of Health, 2015[10]

Box 3. Fruit consumption tips

- Fresh and frozen are best
- Limit fruit juice and dried fruit
- Tinned fruit in juice can be a good emergency option, but avoid the varieties in syrup
- Eat seasonally and choose a variety of different-coloured produce
- Aim for two serves of fruit per day, every day
- Adding fruit to breakfast and having one piece as a snack or dessert is an easy way to increase fruit consumption

Box 4. What equals one serve of vegetables?

A serve of vegetables is approximately 75g (100–350kJ), which is equivalent to:

- Half a cup of cooked green or orange vegetables (broccoli, spinach, carrots or pumpkin)
- Half a cup of cooked dried or canned beans, peas or lentils (preferably with no added salt)
- 1 cup of green leafy or raw salad vegetables
- Half a cup of sweet corn
- Half a medium potato or other starchy vegetables (sweet potato, taro or cassava)
- One medium tomato

Source: Australian Government Department of Health, 2015[10]

◁PAGE 18 discretionary drinks for children and alcohol for adults.

Most commonly consumed meats were beef and chicken at dinner and ham at lunch. During snack times, mostly dairy, fruit and discretionary foods and beverages were consumed.[13]

Because dinner and lunch were reported as the largest meals and considering the recommendation to have half the meal consist of vegetables, these meals are suggested as the starting point for increasing vegetable intake.

dietary intake when comparing people's usual dietary intake with the national reverence values for vitamins and minerals.

With a low percentage of Australians meeting their fruit and vegetable intake, a number of Australians have vitamin and mineral deficiencies (see figure 4).[15]

Common reasons for deficiencies include poor fruit and vegetable intake, avoiding certain food groups (intolerance, fad diets, vegan, vegetarian, food beliefs and food culture) and allergies.[16] Regular monitoring and dietary intervention (which may include supplementation, education and assessment) will assist in decreasing the percentage of Australians deficient in vitamins and minerals.

Maintenance of a healthy weight is an enormous benefit from increasing vegetable intake.

Emphasise that vegetable dishes do not have to be boring or bland and make the following suggestions: eat vegetables raw, grated, sliced, stir-fried, steamed, boiled or baked.

Mix vegetables together and add herbs and spices. Eat with hummus or chop into mini frittatas as a high protein snack.

Add grated vegetables, peas and corn to rissoles, and steam vegetables to blend into tomato-based sauces (to hide them from fussy eaters). Add lentils to mince dishes, and serve rice and pasta as smaller portions with a side of vegetables or salad.

OTHER REASONS TO INCREASE VEGETABLE INTAKE

It can be difficult to motivate young patients to increase their vegetable intake by explaining how it will decrease their risk of chronic disease. For these patients, finding an incentive congruent with their current health concerns encourages better compliance. Motivational factors may include that eating more vegetables will make you feel better, look better, have more energy and perform better in sports.

Maintenance of a healthy weight is an enormous benefit from increasing vegetable intake.[8]

Vegetables are extremely low in energy and high in fibre. Achieving the daily intake of five serves (equates to five cups of salad or 2.5 cups of vegetables) promotes weight loss or successfully maintains a healthy weight.[8]

Improved physiological functioning includes boosted immunity with increased resistance to colds and flu and improved utilisation of ingested food.[8] Increased vegetable intake will prevent the development of deficiency states, with iodine, iron and calcium deficiency the most commonly reported in the general population in developed countries.[14]

VITAMIN AND MINERAL DEFICIENCIES

THE NHMRC has developed Nutrient Reference Values (NRVs), a set of recommendations for Australians' nutritional intake. They are described as: "The Estimated Average Requirement (EAR) sets a nutrient level that is used to estimate the prevalence of inadequate intakes across the population, while intakes

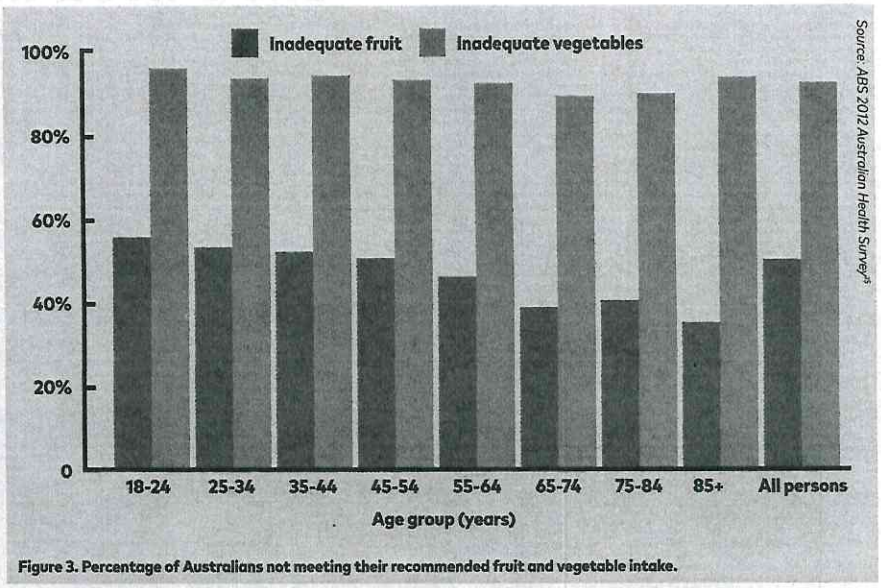


Figure 3. Percentage of Australians not meeting their recommended fruit and vegetable intake.

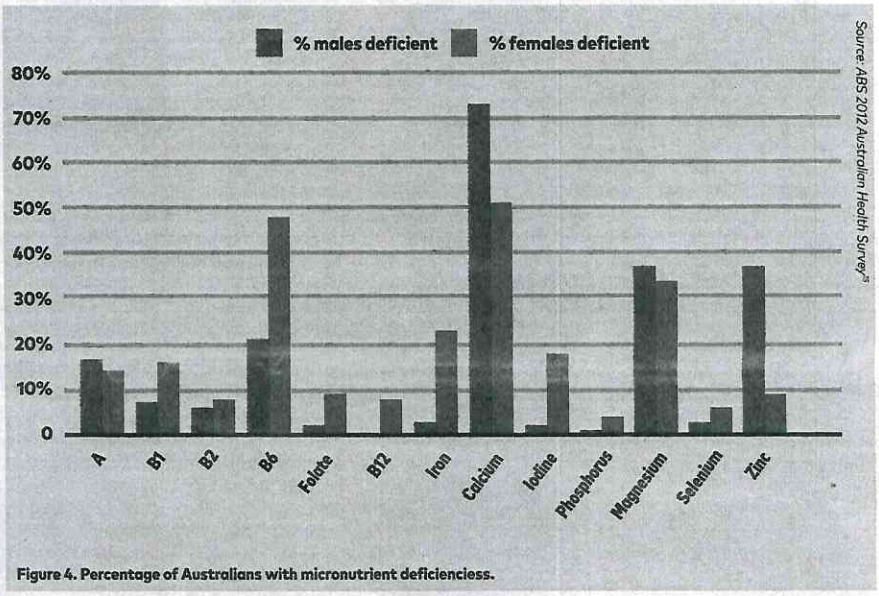
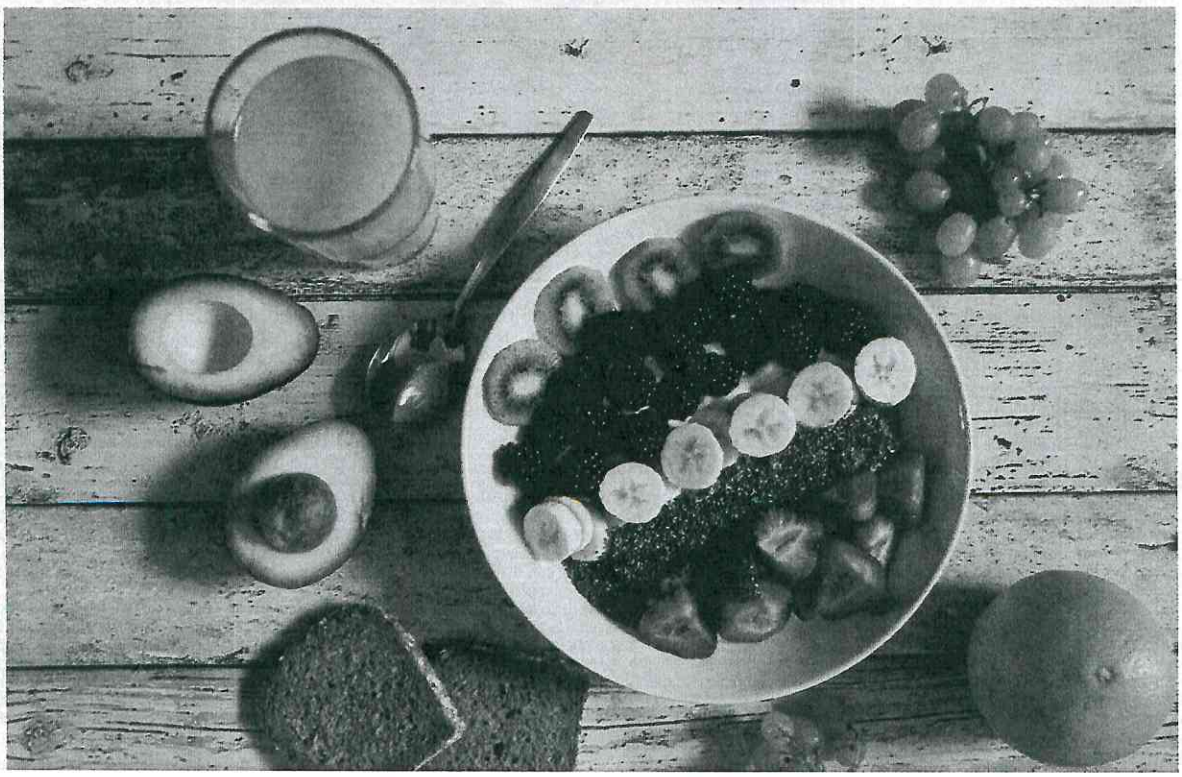


Figure 4. Percentage of Australians with micronutrient deficienciess.



with 23% of females below the EAR compared with 3% of males.[11]

The best dietary sources of iron are red meat, fish, poultry, beans, almonds, eggs and fortified cereals and breads.

It is important to note there is currently a social movement towards veganism, often without adequate education about how to maintain a balanced diet while following a vegan diet. Plant-based sources of iron are poorly absorbed and require much larger intake of these foods to meet the EAR. The diets some vegans may adopt can be very energy dense and contribute to overweight or obesity.

Sodium is an important nutrient but too much may be associated with hypertension, increasing the risk of cardiovascular and renal conditions.[11] While sodium is found naturally in foods such as milk, cream, eggs and meat, the major dietary source is processed foods where sodium acts as a flavour enhancer and preservative.

A large proportion of the population exceeded the upper level for sodium, particularly younger age groups. In children aged 2-8, almost all males exceeded the upper level, as did approximately 95% of females (see figure 5).[11]

In general, more males exceeded the upper level than females, and this difference was more pronounced for every age group over nine. Reducing processed foods and choosing no added salt or reduced salt products, as well as not adding salt during cooking, are the most effective ways of reducing sodium intake.

Table 2 outlines all major vitamins and minerals, their functions, deficiency symptoms and most common Australian dietary sources.

MANAGEMENT

Assessment

DETAILED history-taking and examination will identify patients not meeting their minimum fruit and vegetable daily intake. This will enable appropriate individual treatment of patients with or at risk of developing vitamin and mineral deficiencies, the overweight and obese, and those with a chronic disease.

GPs may not have the time to undertake the process used by dietitians when evaluating a patient's diet. This process includes a thorough diet history, assessment of dietary quality and any risk of vitamin and mineral deficiencies.

The detailed diet history combined with any chronic disease or current symptoms is then used to formulate the food changes required to optimise the individual's health.

The most time-efficient method to obtain a snapshot of a patient's dietary intake is to ask for a 24-hour recall, combined with a food frequency questionnaire.[18]

This comprises asking the patient to describe everything they have eaten in the past 24 hours, followed by a quick checklist to identify any missed foods. It is important to note that there is a strong underreporting bias in all dietary assessments, including recall.[17]

The most commonly under-reported items include energy from drinks, including alcohol, juice and coffees; with other under-reported foods including discretionary snacks and portion sizes.[18] The number of meals eaten out per week are also under-reported, with this data possibly being compounded by the introduction of food delivery services that have increased the convenience of ordering in food.[19] The health impacts of eating out are so significant that some countries, such as Brazil and many European countries, have included consuming more meals at home as part of their dietary guideline recommendations.[18] Families who eat more meals at home significantly reduce their fat and sodium intake and increase their vegetable intake.[19] Remember to also ask about the number of meals and snacks purchased per day or per week.

There are numerous electronic self-assessment tools that patients can use to obtain an overview of their diet quality (see Online resources).

There is a strong underreporting bias in all dietary assessments, including recall.

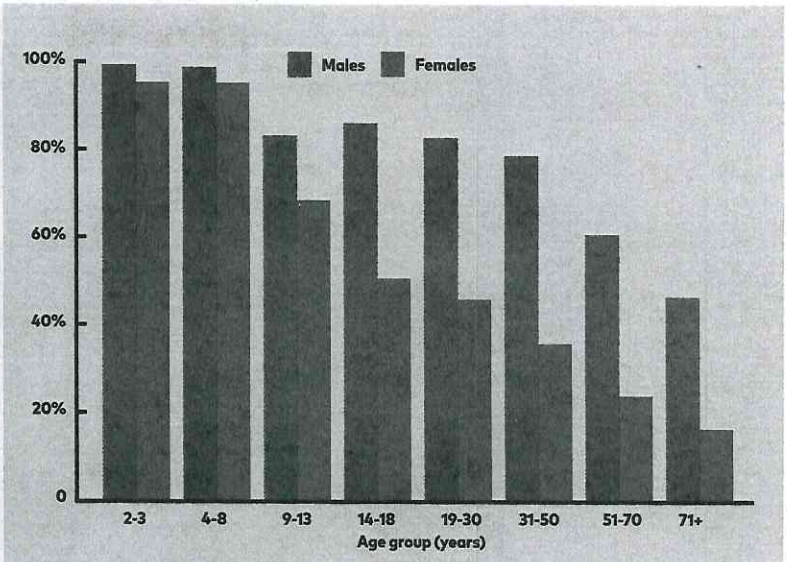


Figure 5. Percentage of Australians exceeding the upper limit for sodium. *Source: ABS 2012 Australian Health Survey*[11]

Suggested dietary changes

In addition to increasing fruit and vegetable intake in accordance with the recommendations, a range of other dietary changes may be beneficial.

INCREASE DIETARY FIBRE

Fibre is that portion of food not digested in the small intestine. It moves largely unchanged into the colon where it is fermented by favourable colonic bacteria.[20] The enzymes produced by intestinal bacteria are important in the metabolism of vitamin K, biotin, vitamin B12, folic acid and thiamine.[7]

The recommended daily fibre intake is at least 25-30 grams. Additional dietary fibre reduces the risk of constipation, diverticular disease, haemorrhoids, bowel cancer and cardiovascular disease.[7]

There are two kinds of fibre, insoluble and soluble.

Insoluble fibre adds bulk and maintains bowel regularity. It is

Table 2. Major micronutrients, their functions and symptoms of deficiency

Vitamin/mineral	Function	Deficiency symptoms	Food sources
A	Normal immune function, vision, reproduction	Poor immune function, vision impairment, impaired reproductive capacity	Orange and yellow vegetables, liver, dairy
B1 (thiamine)	Energy, metabolism	Cognitive dysfunction	Bread making flour, fortified cereals
B2 (riboflavin)	Converting nutrients into their active forms	Pre-eclampsia, redness and swelling of oral mucosa, cheilosis, glossitis, seborrhoeic dermatitis	Mushrooms, milk, pork, liver
B3 (niacin)	Carbohydrate, fat, protein utilisation	Pellagra (inflamed skin, diarrhoea, dementia)	Liver, chicken, pork, anchovies, tuna
B6 (pyridoxine)	Amino acid metabolism	Microcytic anaemia, glossitis, depression, confusion, weakened immune system	Meat, poultry, game meat, milk products, chickpeas, tuna
B12 (cobalamin)	Normal functioning of brain and nervous system, formation of blood	Fatigue, easy bruising and bleeding, bowel upset	Meat, dairy
C	Collagen synthesis, antioxidant	Poor wound healing, weakened connective tissue, scurvy	Red capsicum, orange, broccoli, strawberries
D	Assists in calcium absorption, bone strength maintenance	Rickets (children), osteomalacia (adults)	Fatty fish (salmon, tuna), beef liver, sunlight activates vitamin D in body
E	Antioxidant	Muscle weakness, retinopathy, poor immune response	Peanut butter, avocado, spinach
K	Blood clotting, bone metabolism	Bleeding	Green leafy vegetables
Folate	Healthy growth and development	Neural tube defects	Green leafy vegetables, fruit, grains
Iron	Transporting oxygen in blood to tissues and muscle, and cognitive function	Iron deficiency anaemia, fatigue	Meat and fortified cereal products
Calcium	Bone mass growth	Osteoporosis, osteopaenia	Dairy
Sodium	Maintenance of normal fluid balance, blood volume and pressure	Hyponatraemia (vomiting, nausea, headache, confusion, muscle weakness)	Processed meats, confectionary snacks, condiments
Iodine	Thyroid hormone production, normal brain development	Goitre, hypothyroidism	Bread, milk, iodised salt
Phosphorus	Bone and teeth formation, protein production, energy producing activity in cells	Osteomalacia	Meat and dairy, egg yolk
Magnesium	Protein production, nerve and muscle function, blood glucose control, brain development	Fatigue, abnormal heart rhythm, nausea and vomiting	Coffee, cereals, meat
Selenium	Antioxidant, thyroid metabolism	Keshan disease (congestive cardiomyopathy resulting from dietary deficiency of selenium and the presence of a mutated strain of Coxsackievirus)	Meat, poultry, game meats, seafood
zinc	Regulation of gene expression, maintain protein cell structure integrity	Growth restriction, loss of appetite, immune dysfunction	Meat, cereal, dairy

◂ difficult to digest, very filling and works like a 'broom' through the bowel. Foods higher in insoluble fibre include whole grain breads and cereals, the outer skins of fruit and vegetables, nuts and seeds, raw lentils, kidney beans and chickpeas.

Soluble fibre dissolves in water to form a thick gel in the intestines, slowing down digestion.

Foods containing soluble fibre can help stabilise blood glucose levels in those with diabetes and may help to lower LDL cholesterol levels by collecting fatty deposits as it moves through the intestine.[21]

By slowing down digestion, foods that are high in soluble fibre can help one feel fuller for longer after eating. Foods higher in soluble fibre include fruits and vegetables, dried beans, and lentils and oats.

Encourage patients to eat more whole grains, fruits, vegetables, dried beans and lentils daily.

INCREASE RESISTANT STARCH

Resistant starch is a unique type of fibre. While most starch is digested in the upper part of the gut, resistant starch resists digestion in the small intestine and so progresses to the large intestine.

Once in the large intestine, favourable bacteria ferment resistant starch. This process produces gasses that keep the lining of the bowel healthy.[21] Resistant starch can be found in slightly undercooked pasta, underripe bananas, legumes and pulses (peas, beans, chickpeas, lentils), cooked and cooled potato, and 'Hi-maize', which is found in commercial food products such as breads and cereals.

DECREASE PROCESSED FOODS

Ingesting processed foods risks altering the gut flora balance, with an excess of unfavourable compared with favourable bacteria.[21] This can lead to acute and chronic inflammation, IBS, colitis, food intolerance, altered immune function, and low mood and fatigue.[21]

PROBIOTICS

Probiotics are 'good' bacteria or yeasts, like those found naturally in the gut. When taken in adequate amounts, they can improve the balance of the gut microbiome.

A lot of research has been done on probiotics and the evidence on their efficacy is mixed.[22] Probiotics are found in yoghurt, milk drinks like kefir, and other fermented foods like kombucha, kimchi, miso, tempeh, sauerkraut and sourdough bread. Probiotic supplements are also available.

Bacterial gut balance can be disrupted by several medical and emotional conditions, physical stress and ageing. A common cause of gut microbiota disruption is antibiotic use, which can lead to bacterial overgrowth of certain 'antibiotic-resistant populations' of bacteria in the intestine.[22]

Probiotics help tip the balance back in favour of the good bacteria. In so doing, they may provide some relief from gastrointestinal pain, symptoms of irritable bowel syndrome, ulcerative colitis, diarrhoea, low mood and inflammation.[22]

FIBRE VERSUS FERMENTED FOODS

Fermented foods are promoted for their health benefits, particularly when it comes to improving digestion and gut health. In the past, these benefits were attributed to probiotics.

In addition to probiotics, fermented foods generally contain acetate, a short-chain fatty acid and the by-product of bacterial fermentation. Short chain fatty acids are produced by beneficial gut bacteria as a by-product of the fermentation of dietary fibre.[22]

Short chain fatty acids appear to deliver health benefits.

While current research highlights the importance of consuming a high-fibre diet for optimal short chain fatty acid production in the gut, there remains a question around the role of dietary sources of short chain fatty acids.[22]

In the interim, suggest patients incorporate more fermented foods into their diet, being mindful of the added sugars in some products, while focusing on increasing their fibre intake.[22]

GUT BRAIN AXIS AND MENTAL HEALTH

The enteric nervous system has more neurons than the central nervous system (CNS).[22] This demonstrates the complexity of gut function and the significant inter-relationships with other areas of physiological functioning.

It has recently been recognised that healthy gut function is strongly linked to normal CNS function.

"Hormones, neurotransmitters and immunological factors released from the gut are known to send signals to the brain either directly or via autonomic neurons".[22]

A growing number of studies are emerging on variations in the microbiome and the effect on anxiety, depressive disorders, schizophrenia and autism, indicating a valuable area for future medical and nutritional practice.[23]

Healthy gut function is strongly linked to normal CNS function.

This highlights the importance of a healthy microbiome, particularly the gut microbiota, for patients suffering from anxiety and depression, as dysbiosis and inflammation in the CNS have been linked to mental illness.

A meta-analysis showed that probiotics (both food and supplementary forms) effectively diminish the symptoms of anxiety and depression similarly to conventional prescription medications.[23]

FUTURE DIRECTIONS

'GUT HEALTH' is a growing area in the health industry. Research has identified links between gut health and mood, weight management and the immune system.[20]

Gut health is optimised by a change in diet, altering 'bacteria balance' and increasing favourable gut bacteria.[20] Bacteria live off a variety of nourishing plant-based foods, with healthy gut bacteria assisting with digesting and absorbing nutrients, synthesising vitamins and fighting unfavourable bacteria and carcinogens.[20]

CASE STUDY

BEVERLEY, 67, presents to her GP for her regular scheduled six-monthly check-up. She has a history of diverticulitis (no recent exacerbations), hypertension, hyperlipidaemia, recent onset type 2 diabetes, osteoarthritis of her knees and hips, and depression and anxiety.

Her medications include candesartan, fluoxetine, a slow-release paracetamol and a Cox-2 inhibitor when required.

On examination, her BP is 136/87mmHG, weight 72kg (this has been stable for years), height 168cm and BMI 25.5kg/m^2.

Fasting bloods reveal glucose 7mmol/L (3.0-5.4), total cholesterol 7.1mmol/L (<4mmol/L), triglycerides 1.7mmol/L (<1.7), HDL 1mmol/L (≥1mmol/L), LDL 5.5mmol/L (<2mmol/L).

Beverley and her GP discuss her options, and Beverley is adamant she wants to use lifestyle modifications to mange her diabetes and hyperlipidaemia. The GP refers her to a dietitian using a Chronic Disease Management plan.

During the dietitian consultation, Beverley advises she is about to go on a three-week cruise and is worried about managing her food intake.

Her exercise is limited to sometimes using the exercise bicycle and some walking, and she finds excuses not to exercise. She also struggles to make consistent changes to her lifestyle.

Dietary assessment shows Beverley consumes a large quantity at breakfast, eats quite well at lunch, but is under-eating in the morning and afternoon. This is causing over-eating in the evenings.

The evening meal lacks vegetables and is high in

PAGE 24 ▸

◂PAGE 22 carbohydrates and protein, with ice cream every night.

Beverley is retired and often eats out for meals and snacks with friends. Her diet is low in fruits and vegetables, and is high in cakes and biscuits.

The first consultation focuses on portion sizes and the proportions of macronutrients in main meals. This allows Beverley the flexibility to eat out, holiday and have foods she enjoys, keeping the carbohydrate portion down and increasing vegetables to at least two 'open hands worth' at lunch and the evenings.

Appropriate snack choices to take on the cruise are discussed.

Beverley returns after her cruise, reports the strategies are manageable, and has lost 1.4kg.

Monthly appointments continue, with Beverley making small changes: moving to low GI carbohydrates, limiting discretionary foods to a few times a week, reducing saturated fat and increasing unsaturated fat by choosing leaner cuts of meat, using less oil, adding nuts, seeds, fish and avocado regularly to meals and cutting down her sodium intake.

A food diary provides motivation and accountability.

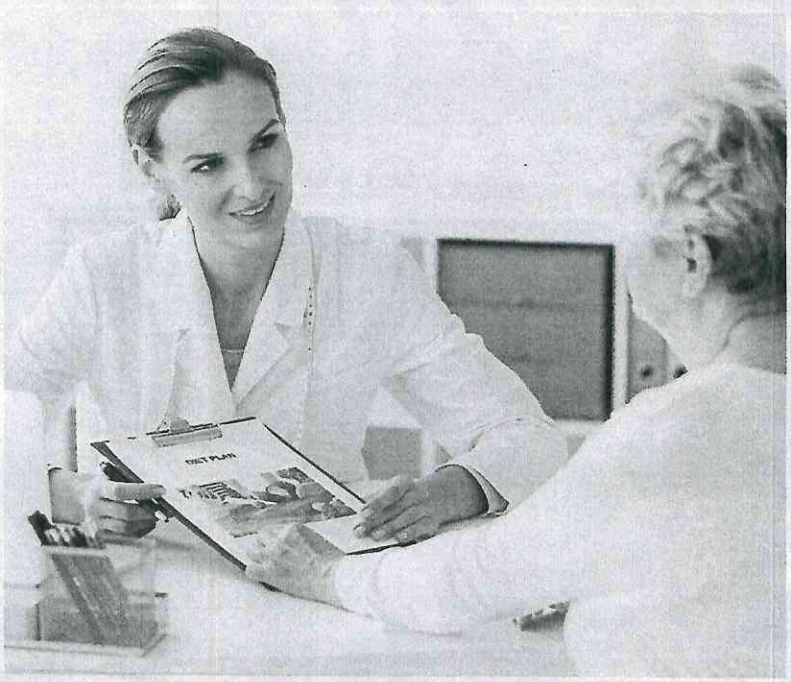
Six visits and five months later, Beverley has lost 9kg, 11cm off her waist and her BMI is 22.3kg/m^2.

She reports increase in energy, physical activity and overall improvement in her general health, with significantly less knee and hip pain. A 10% reduction in weight translates into a 50% reduction in lower limb osteoarthritis pain.[24]

Fasting blood results show blood glucose 5.7mmol/L (3.0-5.4), total cholesterol 6.3mmol/L (<4mmol/L), HDL 1.3mmol/L (≥1mmol/L), LDL 4.3mmol/L (<2mmol/L) and triglycerides 1.4mmol/L (<1.7).

Key points

- A multidisciplinary approach to health care is effective and improves patient health outcomes.
- Medical nutrition therapy is crucial in the management of chronic disease.
- Australians have poor intakes of fruit and vegetables and this directly relates to micronutrient deficiencies, overweight and obesity and chronic disease.
- Gut health is showing promise in assisting with mood, gastrointestinal conditions, chronic disease and weight management.



Beverley feels she can sustain these changes long-term. She plans to discuss with her GP reducing or ceasing some of her medications.

CONCLUSION

POOR health and disease cannot be generally attributed to any one single food component. Diseases associated with diet are also associated with environmental, behavioural, biological, societal and genetic factors. The complex interplay between food, risk factors and disease requires a comprehensive GP assessment and a dietitian evaluation, if indicated.

In an optimal diet, the supply of energy and nutrients is adequate for tissue maintenance, repair, growth and activity demands.

The proteins, carbohydrates, fats, vitamins and minerals required to maintain the "human body in good health are met by eating a wide variety of nutritious foods, including five servings of vegetables and two servings of fruit per day".[15] To reduce Australia's obesity and chronic disease epidemic, manage gut health and prevent vitamin and mineral deficiencies, fruit and vegetable intake needs to increase and processed food intake to decrease.

Consider the potential positive impact of a multidisciplinary approach to dietary prescription.

If the patient understood the role of their diet in chronic disease management, weight management and mental health, would they adhere to this prescription in a similar way to a medication prescription? Dietary prescription could include the required daily serves of vegetables and fibre, and the number of meals to be consumed at home.

With all the associated benefits, and the recommendations of the Australian dietary guidelines, it is time to prescribe specific food intake targets rather than making general suggestions of weight loss and healthy eating.

ONLINE RESOURCES

- **Sports Dietitians Australia Fact sheet Iron depletion: bit.ly/2JIZYgc**
- **AIHW. A picture of overweight and obesity in Australia 2017: bit.ly/2Jwzezq**
- **Impact of overweight and obesity as a risk factor for chronic conditions 2017: bit.ly/2GyfsRf**
- **Baker Heart & Diabetes Institute Fact sheets: bit.ly/2Yu6TNI**
- **WHO health diet: bit.ly/2vVcBuy**
- **Healthy eating on a budget: bit.ly/2KsSucX**
- **CSIRO Healthy Diet Score: bit.ly/2FTv6FD**
- **Easy Diet Diary: bit.ly/2xClOKd**
- **Calorie King: bit.ly/2ZmHwOj**

References on request from howtotreat@adg.com.au

How to Treat Quiz.

FOOD AS MEDICINE

GO ONLINE TO COMPLETE THE QUIZ **www.ausdoc.com.au/howtotreat**

1. **Which THREE are major risk factors for chronic disease?**
   - a Inactive or insufficiently active.
   - b Family history of a chronic disease.
   - c Overweight or obese.
   - d Inadequate fruit and vegetable intake.

2. **Which TWO are GP barriers to providing nutrition education?**
   - a Inadequate reimbursement.
   - b Belief that nutritional management does play a role in disease management.
   - c A lack of time.
   - d Belief that the patient knows more about their own nutrition and is best placed to manage this.

3. **Which ONE group of Australians comes closest to consuming their recommended daily intake of fruit?**
   - a Those over 80.
   - b Women under 65.
   - c Men and women 18-24.
   - d Men 18-24.

4. **Which THREE equal one serve of vegetables?**
   - a Half a cup of cooked green or orange vegetables.
   - b Half a cup of cooked dried or canned beans, peas or lentils.
   - c One medium tomato.
   - d Half a cup of green leafy or raw salad vegetables.

5. **Which TWO are the most commonly reported deficiencies in developed countries?**
   - a Vitamin D.
   - b Iron.
   - c Vitamin B12.
   - d Calcium.

6. **Which THREE may be features of riboflavin deficiency?**
   - a Eclampsia.
   - b Seborrhoeic dermatitis.
   - c Cheilosis.
   - d Redness and swelling of the oral mucosa.

7. **Which ONE is the most under-reported item on dietary assessment?**
   - a Discretionary snacks.
   - b Energy from drinks.
   - c Portion sizes.
   - d The number of meals eaten out.

8. **Which THREE foods are high in insoluble fibre?**
   - a Whole grain breads and cereals.
   - b Oats.
   - c Nuts and seeds.
   - d Chickpeas.

9. **Which TWO statements regarding nutrition are correct?**
   - a Probiotics are found in everyday foods like yoghurt, milk drinks like kefir, and other fermented foods.
   - b Soluble fibre dissolves in water to form a thick gel in the intestines, slowing down digestion.
   - c Fibre is the portion of food that is not digested in the colon.
   - d Ingesting processed foods risks altering the gut flora balance, with an excess of favourable compared with unfavourable bacteria.

10. **Which THREE statements regarding nutrition are correct?**
    - a Studies have shown that probiotics have no impact on the symptoms of anxiety and depression.
    - b The role of dietary short chain fatty acids is uncertain.
    - c Healthy gut function is strongly linked to normal CNS function.
    - d Gut health is optimised by a change in diet, altering 'bacteria balance' and increasing favourable gut bacteria.

CPD POINTS

- We have a new How to Treat website (www.ausdoc.com.au/howtotreat) where you can read this article and take the quiz to earn CPD points.
- Each article has been allocated 2 RACGP QI&CPD points and 1 ACRRM point.
- RACGP points are uploaded every six weeks and ACCRM points quarterly.