

National Cancer Prevention Policy

2007–09



Preventable risk factors

Nutrition



N u t r i t i o n

In Australia, more than 6000 deaths from cancer each year may be attributed to three major risk factors: inadequate intake of vegetables and fruit, inadequate physical activity, and overweight and obesity.

Introduction

The importance of food in the prevention of cancer is becoming increasingly recognised. International variation in cancer rates, combined with the diversity of eating patterns around the world, is the first line of evidence that food and nutrition play a role in cancer aetiology. In the past few decades, case-control studies, large prospective cohort studies and the use of meta-analyses have provided good evidence to support this link. As well, potential mechanisms of action of specific nutrition components have been identified in experimental studies.

The study of the influence of nutrition on cancer is a complex area of research. Contributing to the complexity are obtaining accurate records of what and how much a person eats, determining the separate and/or combined effects of different foods on cancer risk, and the long timeframes between dietary exposure and development of disease.

Despite these challenges, there is accumulating evidence to show certain foods and nutrients can either increase or decrease cancer risk. There is also convincing evidence that maintaining a healthy body weight can help to reduce cancer risk, and a healthy diet combined with sufficient physical activity is key to maintaining a healthy body weight. The recommended eating patterns for reducing cancer risk are consistent with recommendations for the prevention of cardiovascular disease and type 2 diabetes. Diets that include vegetables, fruit, grains and cereals (preferably wholegrain), and are low in fat (particularly saturated fat), salt and energy, support the prevention of all three of these chronic diseases.

The remainder of this chapter summarises current national recommendations and population trends concerning food and nutrition. It should be read with the chapters on physical activity and overweight and obesity. Alcohol, while an aspect of diet, is dealt with in a separate chapter.

The link between nutrition and cancer

In recent years there have been four major reviews of the epidemiological literature linking nutrition and cancer:

- World Cancer Research Fund and American Institute for Cancer Research: *Food, nutrition and the prevention of cancer: a global perspective* (WCRF & AICR 1997)
- Committee on the Medical Aspects of the Food Supply, UK Department of Health: *Nutritional aspects of the development of cancer* (the 'COMA report') (UK Department of Health 1998)

- World Health Organization and Food and Agriculture Organization: *Diet, nutrition and the prevention of chronic diseases* (WHO & FAO 2003)
- International Agency for Research on Cancer: *IARC handbooks of cancer prevention volume 8: fruit and vegetables* (IARC 2003).

The updated report from the World Cancer Research Fund is due for release at the end of 2007.

An overview of the findings from these reports, plus more recent evidence, is summarised below.

Fruit and vegetables

Fruit and vegetables are recommended, for their important role as a low-energy-dense source of nutrients (vitamins, minerals, phytochemicals and fibre) and for their contribution to weight management, as well as for their probable cancer-protective effect exerted through a range of bioactive constituents which are plausible anti-cancer agents.

The evidence supporting a protective effect of fruit and vegetables is strongest in relation to cancers of the digestive tract. Ensuring an adequate intake of fruit and vegetables is likely to reduce the risk of cancers of the oral cavity, oesophagus, stomach, colorectum and lung (IARC 2003).

Over the last 10 years there has been a shifting of the evidence relating to the cancer protectiveness of fruit and vegetables, as outlined in the table below. While earlier reviews, which mostly relied on the evidence from case-control studies, concluded that fruit and vegetable consumption convincingly reduces the risk of cancers of the gastrointestinal tract, more recent prospective studies have not found results to support this (Michels et al. 2000; Bingham et al. 2003). It is generally believed that fruit and vegetables may help to indirectly protect against cancer by helping to maintain a healthy body weight.

Table 1.4 Conclusions of the major nutrition and cancer reports regarding the cancer-protective effect of vegetables and fruit

Organisation review	Highest evidence	Moderate evidence	Lower evidence
WCRF & AICR 1997	Convincing Mouth Pharynx Oesophagus Stomach Colon Rectum Lung	Probable Larynx Pancreas Breast Bladder	Possible Ovaries Cervix Endometrium Thyroid Liver Prostate Kidney
UK COMA 1998	Strongly consistent Oesophagus	Moderate association Stomach Colon Rectum	Weak Breast cancer
WHO & FAO 2003		Probable Oral cavity Oesophagus Stomach Colorectum	
IARC 2003		Probable Oesophagus (fruit & vegetables) Stomach (fruit) Lung (fruit) Colon-rectum (vegetables)	Possible Mouth (fruit & vegetables) Pharynx (fruit & vegetables) Colon-rectum (fruit) Larynx (fruit & vegetables) Kidney (fruit & vegetables) Bladder (fruit) Stomach (vegetables) Lung (vegetables) Ovary (vegetables)

Source: Dixon et al. 2004

Fruit and vegetables contain an array of protective nutrients and phytochemicals. Despite many attempts, research has not identified which specific component of fruit or vegetables provides a cancer-protective effect. A recent review by IARC (2004) suggests cruciferous vegetables may be important because they contain substantial amounts of glucosinolates, which are hydrolysed to isothiocyanates and indoles. Experimental studies have shown that these compounds inhibit carcinogenesis, however these results have only been partially corroborated by epidemiological studies. It is generally agreed that there is inadequate evidence to suggest that the consumption of cruciferous vegetables or any one particular type of fruit or vegetable reduces the risk of cancer—consuming a variety of fruits and vegetables appears to be the most beneficial (WCRF & AICR 1997; IARC 2004).

Fibre

The current weight of evidence suggests a diet high in fibre could reduce colorectal cancer risk. The European Prospective Intervention into Cancer (EPIC) cohort study confirmed previous findings that high intakes of dietary fibre reduced the risk of colorectal cancer (WCRF & AICR 1997; Bingham et al. 2003). Such diets are high in fibre from a range of sources including wholegrain cereals, fruits and vegetables.

Meat

Research suggests that high red meat consumption, and in particular processed meat consumption, is associated with an increase in colorectal cancer risk (Norat et al. 2002; Sandhu, White & McPherson 2001). An Australian cohort study has identified an association between red meat and increased risk of rectal cancer (English et al. 2004). There has been some inconsistency in the evidence, which may be related to issues such as the definition of red meat or control of confounding factors such as other related aspects of diet (fat, low vegetable intake, etc.), but overall results, including findings from the EPIC cohort study (Norat et al. 2005), support a modest increase in risk.

Some research suggests that eating burnt or charred meat may increase cancer risk; however, the evidence is not conclusive (Norat & Riboli 2001).

Fish

Experimental studies have shown that omega-3 fatty acids influence cancer development by lowering inflammation (Rose & Connolly 1999). Fish is a good dietary source of omega-3 fatty acids. Some epidemiological studies show that higher intakes of fish and/or omega-3 fatty acids may reduce the risk of developing colorectal cancer and hormone-dependent cancers such as breast and prostate cancer, but this research can only be described as suggestive not conclusive (Ralph et al. 2006).

Dietary fat

There has been a great deal of interest in the possible association between fat and cancer. The World Cancer Research Fund report concluded that total fat possibly increased risk of cancer of the lung, colon, rectum, breast and prostate (WCRF & AICR 1997), although the UK review did not find sufficient evidence to make any recommendations about fat and cancer (UK Department of Health 1998).

Current evidence does not indicate a direct link between fat intake and cancer at any site (Kushi & Giovannucci 2002; Willett 1998). As foods high in fat have a high energy density, diets high in fat can contribute to obesity (NHMRC 2003a), and obesity is a risk factor for several cancers (IARC Working Group 2002).

It may be possible that different types of fat affect cancer differently, as some studies have suggested that omega-3 fatty acids may reduce the risk of developing colorectal, breast and prostate cancer (Ralph et al. 2006).

Salt

Diets high in salted foods have been linked to an increased risk of stomach cancer (WCRF & AICR 1997). The evidence for an increased incidence of stomach cancer in association with high-salt diets comes from countries where salting of foods (meats) is a common preserving method. Ecological research has shown that in countries where refrigeration is commonly used for storage of perishable forms of food, stomach cancer has a relatively low incidence (Cohen & Roe 1997; Roder 2002).

Dietary supplements

Certain foods that are rich in micronutrients and phytochemicals may play a role in cancer prevention. Micronutrients include vitamins (e.g. folate, beta-carotene, vitamins C and E) and minerals (e.g. selenium, calcium). Some biologically active substances or phytochemicals (e.g. lycopenes, indoles and allicin) have been investigated for cancer protective properties.

Much of the evidence for dietary supplements is derived from experimental studies and not properly conducted clinical trials. However the results from the large-scale randomised controlled trials on the efficacy of dietary supplements to reduce the risk of cancer have been disappointing. For example, the Alpha-Tocopherol, Beta-Carotene Cancer (ATBC) Prevention Trial and Beta-Carotene and Retinol Efficacy Trial (CARET) both showed increased risk of certain cancers and mortality with supplementation (Bowen et al. 2003; Leppala et al. 2000; Smigel 1996).

Any diet–cancer association is far more complex than simply supplementing the diet with micronutrients. Micronutrients ingested in supplement form are often pharmacologically active, and contain much higher doses than the level of micronutrients someone would receive in a typical diet. It seems to be the combination and interaction of nutrients and phytochemicals found together in whole foods that helps reduce the risk of chronic diseases (WCRF & AICR 1997). The use of supplements in place of a well-balanced diet is generally not recommended (WCRF & AICR 1997). However some randomised controlled trials of calcium supplements have shown some potential for lowering the risk of bowel polyps and cancer (Weingarten, Zalmanovici & Yaphe 2005).

Selenium

Some studies suggest that selenium may be inversely associated with prostate cancer and colorectal cancer, but most of this evidence comes from trials designed to answer questions about other types of cancer (Clark et al. 1996; Duffield-Lillico, Dalkin et al. 2003; Duffield-Lillico, Slate et al. 2003). The evidence of a protective role of selenium in other types of cancers is weak and inconsistent (Duffield-Lillico et al. 2002; WCRF & AICR 1997; WHO & FAO 2003). The true effects of selenium require confirmation in independent trials before new public health recommendations regarding selenium (either from dietary sources or as supplements) can be made (Combs 2005). The Selenium and Vitamin E Cancer Prevention Trial (SELECT) will determine if selenium supplements can protect against prostate cancer. However the results of this trial will not be available until 2012.

The impact

On a global basis and at current rates, appropriate nutrition and physical activity may prevent three to four million cases of cancer every year (WCRF & AICR 1997). In Australia, more than 6000 deaths from cancer each year may be attributed to three major risk factors: inadequate intake of vegetables and fruit, inadequate physical activity, and overweight and obesity (Mathers, Vos & Stevenson 1999). These risk factors, through their contribution to development of cancer alone, are estimated to contribute 3.8% of the total burden of disease and injury in Australia. Inadequate vegetable and fruit intake has been estimated to cause 11% of the total cancer burden (Mathers, Vos & Stevenson 1999) and 1.4% of the total burden of disease in Australia (AIHW 2006).

In Australia, the direct cost of poor diet to the Australian health care system (that is hospitals, medical expenses, allied health professional services, pharmaceutical expenses and nursing homes) has been estimated to be in the order of \$1.5 billion per year. This increases to \$2.2 billion when indirect costs such as low productivity are included (Lester 1994; Mathers, Vos & Stevenson 1999).

Costs associated with some diet-related cancer have been estimated at \$61 million (1989–90 figures) in direct costs, and \$132 million in indirect costs (Crowley et al. 1992).

Increasing average vegetable consumption by one serve/day has been estimated to save \$24.4 million per year from the cost of colorectal, breast, lung and prostate cancers, and increasing average fruit consumption by one serve/day could save \$8.6 million per year from the costs of breast and lung cancers (Marks et al. 2001). This same report also estimated that consuming more than one serve of red meat per day accounted for \$8.6 million of the total health system cost for colorectal cancer (Marks et al. 2001). Increasing fruit and vegetable consumption by one serve a day per person would result in direct health care savings of \$180 million a year (Marks et al. 2001). These figures are based on consumption patterns from the 1995 National Nutrition Survey and a meta-analysis of the diet–cancer relationship conducted in 2001, and therefore may not truly reflect the current situation.

The challenge

A number of surveys have documented that Australians have below-optimum eating habits to protect them against overweight, obesity and cancer risk (and other chronic diseases such as cardiovascular disease and diabetes). The 1983, 1985 and 1995 National Nutrition Surveys (ABS & CDHAC 1997) and the Australian Bureau of Statistics' Apparent Consumption of Foodstuffs and Nutrients (ABS 2000) data provide an indication of dietary intakes in Australia. State-based dietary surveys have also been conducted, for example in Western Australia (Miller & Kose 1996; Hands et al. 2004), Victoria (CSIRO 1993; Catford 2002), and New South Wales (Bauman et al. 2003)

Currently the Australian population does not consume the recommended levels of most key dietary items, such as vegetables, fruit and wholegrain cereals. Recent trends are shown in the table below. Over the last 20 years it appears that wholegrain cereal food intake has increased, but it is still not at recommended levels. Fat intake has reduced, but is still not low enough, particularly saturated fats. Consumption of vegetables and fruit is too low, particularly among children.

Table 1.5 Current trends in consumption and the proportion of the population not consuming recommended levels of specific foods related to cancer risk

Dietary factor related to cancer risk	NHMRC recommended levels of consumption (NHMRC 2003 a & b)	Trend in consumption	Proportion NOT meeting minimum levels of consumption in 1995
Vegetable intake	Adults: average of 5 serves per day Children and adolescents: minimum of 2 to 4 serves a day depending on age (CDHFS 1998)	Decline in consumption in both adults and children 1983–95 (Cook, Rutishauser & Seelig 2001)	Adults: 2 in 3 did not meet the recommended daily intake for vegetables (Magarey, McKean & Daniels 2006) Children: 2 in 3 did not meet the recommended daily intake for vegetables (Magarey, Daniels & Smith 2001)
Fruit intake	Adults: average of 2 serves per day Children and adolescents: between 1 and 3 serves a day depending on age	Decline in consumption in both adults and children 1983–95 (Cook, Rutishauser & Seelig 2001)	Adults: 2 in 3 did not meet the recommended daily intake for fruit (Magarey, McKean & Daniels 2006) Children: More than half did not meet the recommended daily intake for fruit (Magarey, Daniels & Smith 2001)
Cereal, bread, pasta intake	Adult men: 5–12 serves per day Adult women: 4–9 serves per day Children and adolescents: 3–11 serves per day, depending on age	Slight decline in adults eating cereal foods on day of survey 1983–95 (Cook, Rutishauser & Seelig 2001) No significant change in children 1983–95 (Cook, Rutishauser & Seelig 2001) BUT significant increase in mean intake of less healthy cereal-based products (e.g. cakes, pies, biscuits) 1985–95	Adults: 2 in 3 men and 4 in 5 women did not meet recommended levels on day of survey (NHMRC 2003a) 5% of men and 4% of women did not eat a cereal product on the day of the survey (McLennan & Podger 1998) Children: <5% did not eat a cereal product on the day of the survey (McLennan & Podger 1998)
Meat intake	Moderate serve of meat: 65–100 g of cooked red meat, 3–4 times a week (CDHFS 1998) Children and adolescents ½–1 serve per day depending on age (CDHRS 1998)	No change in adult men, declined in women 1983–95 (Cook, Rutishauser & Seelig 2001) Slight rise in children's mean intake 1983–95 (Cook, Rutishauser & Seelig 2001)	Adults: 15% of men & 23% of women did not eat meat on day of survey (McLennan & Podger 1998) Adults' mean intake of red meat on day of survey consistent with recommended levels (Baghurst, Record & Leppard 2000) Children: 2 in 10 did not eat meat on day of survey (McLennan & Podger 1998)

Dietary factor related to cancer risk	NHMRC recommended levels of consumption (NHMRC 2003 a & b)	Trend in consumption	Proportion NOT meeting minimum levels of consumption in 1995
Dietary fat intake	Adults: total fat about 30% of total energy intake; maximum of 10% of total energy intake from saturated fat Children and adolescents: total fat about 30–50% of total energy intake (depending on age). Over 5 years saturated fat at maximum of 10% of total energy intake	Adults: significant decline (a positive trend) in mean intake of total fats 1983–95 (Cook, Rutishauser & Seelig 2001) Children: no significant change in total fat intake 1983–95 (Cook, Rutishauser & Seelig 2001)	Adults & children: mean total fat intake and saturated fat intake on day of survey slightly exceeded recommended levels (McLennan & Podger 1998; Marks et al. 2001)
Salt intake	Maximum level of 2300 mg/day; this includes sodium in food as well as that added in cooking or consumption	No national trend data available	Adults: 1993 national data indicate mean sodium intake higher than recommended levels (Baghurst et al. 1996) Children: no data available (NHMRC 2003b)
Sugar intake	< 10% of energy. This includes all sugars added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and fruit juices (WHO & FAO 2003)	No national trend data available	Adults: no data available Children: Mean daily intake ranged from 7–15% of energy in girls and 8–14% of energy in boys (Somerset 2003)

Table adapted from data presented in Body weight, nutrition, alcohol and physical activity: key messages for The Cancer Council Australia by Dixon et al. 2004. The interested reader is referred to this document for greater detail.

Specific population groups

Certain population groups have significantly poorer nutrition and are at higher risk of nutrition-related disease, principally cardiovascular disease and type 2 diabetes (AIHW 2006). The clustering of poor nutrition (both under- and over-nutrition) with smoking, physical inactivity, lower levels of education and income, and low socio-economic status signal the need to develop effective interventions targeting these population groups. Aboriginal and Torres Strait Islander people are particularly at risk, along with residents in remote areas of Australia and those living on low incomes (SIGNAL 2001; Woods, Swinburn & Burns 2003). This clustering presents a complex challenge for addressing nutrition related issues (NATSI Working Party 2001).

Effective interventions

There is mounting evidence about the nature of effective nutrition interventions. Overall the findings from the literature suggest that diet-related interventions can be effective when they are multi-focused and sustainable and involve individual and structural change and

key stakeholders (Sorensen et al. 1998; Syme 1997; Gill, King & Webb 2005; Thomas et al. 2004; Sahay et al. 2006).

This section focuses on interventions that aim to increase consumption of specific foods such as vegetables and fruit and that support dietary modification or healthy eating generally.

Educational interventions focus on changing knowledge, attitudes, skills or the behaviour of individuals. Environmental interventions create opportunities or remove barriers for groups of people. With environmental interventions, the emphasis to change health behaviour moves from the individual to the society that facilitates the unhealthy behaviour. In the case of nutrition, educational interventions attempt to influence the individual demand for certain foods such as soft drinks or high fat food. Environmental interventions attempt to influence the supply of food (e.g. removing soft drinks from vending machines, increasing fruit and vegetable choices at school canteens or cafeterias).

The US Agency for Healthcare Research and Quality reviewed 92 studies of behavioural interventions to promote dietary change considered relevant to cancer risk (AHRQ 2000). In summary, behavioural interventions to increase the intake of fruits and vegetables and to decrease intake of total fat and saturated fat were assessed as successful, although child- and adult-focused interventions varied in efficacy. Interventions were more effective in increasing fruit intake among children and vegetable intake among adults, and more successful at reducing total fat intake of children rather than adults. In contrast, interventions with children were less successful than with adults at reducing saturated fat intake.

Another review, which focused on behavioural interventions to modify fruit and vegetable intake, found that more than three-quarters of the identified studies reported significant increases in fruit and vegetable intake, with an average increase of 0.6 servings/day (Ammerman et al. 2002). Interventions appeared to be more successful at positively changing dietary behaviour among populations at risk of diseases than among general healthy populations. Goal setting and the use of small groups seemed to be particularly promising strategies (Ammerman et al. 2002). Elements of effective interventions include theoretical basis, family involvement, participatory planning and implementation models, clear messages, and adequate training and ongoing support for health professionals (Sahay et al. 2006; Ammerman et al. 2002)

A review of environmental interventions to improve nutrition in children and young people found that multi-component interventions including an education and environmental component directed at improving nutrition were most effective, and that children's nutritional intake can be modified when their food source is modified (Thomas et al. 2004). For primary school and high school students, multifaceted interventions (school curricula, mass media, parent mailings, cafeteria changes) over at least eight to 10 weeks show the most promise for altering food intake (Thomas et al. 2004). Educational messages targeted to behaviour change (as opposed to knowledge acquisition) and to specific behaviours (increase fruit intake, reduce fat intake as opposed to general nutritional changes) are more successful in changing food behaviours (Thomas et al. 2004).

Reviews of population-based diet interventions have emphasised the need to address policies that promote structural change and include community involvement in identifying priorities and interventions (Sorensen et al. 1998; Syme 1997; Gill, King & Webb 2005; Thomas et al. 2004). Less successful interventions fail to address theories and mediating variables in behaviour change (AHRQ 2000).

Further work needs to be done on the cost-effectiveness of interventions.

National and statewide nutrition promotions

Examples of comprehensive approaches to cancer prevention through modification of diet and/or physical activity are limited. In 1991, the US National Cancer Institute launched the 5-a-Day for Better Health Program, a national, population-based nutrition initiative to prevent cancer (Heimendinger et al. 1996). The program was a partnership between the National Cancer Institute and the vegetable and fruit industry and had multi-strategy, multi-setting, multi-level and intersectoral components. Evaluation results indicate that the campaign raised public awareness that vegetables and fruit help reduce cancer risk, increased vegetable consumption and created an ongoing partnership between health and agribusiness (Foerster et al. 1995).

In Australia, there have been several statewide campaigns aimed at promoting increased consumption of vegetables and fruit (e.g. the 'Go for 2&5' campaign, Western Australia 2001–2003; Fruit 'n' Veg with Every Meal, Western Australia 1989–93 and South Australia 1990–91; 2 fruit and 5 Vegetables Every Day, Western Australia 1989–93 and Victoria 1992–95; and Eat Well, Tasmania 1997), although these campaigns did not have a specific cancer prevention focus.

Such campaigns use social marketing strategies to increase public awareness of dietary recommendations for fruit and vegetable consumption and ultimately increase consumption. Where available, evaluation shows these campaigns succeeded in promoting increased awareness, improved public attitudes to fruit and vegetable consumption, and increased knowledge of the recommended number of serves of fruit and vegetables.

Campaigns sustained for a number of years (e.g. Victoria and Western Australia) increased reported vegetable and fruit consumption (Dixon et al. 1998; Ejlak, Seal & van Vaetzen 1998; Miller, Pollard & Paterson 1996; Nutrition & Physical Activity Branch 2005). The 'Go for 2&5' campaign in Western Australia resulted in behavioural changes and in the period 2000 to 2003, fruit intake among WA adults increased from 1.6 serves to 2.1 serves while vegetable intake increased from 2.6 serves to 2.9 serves (Nutrition & Physical Activity Branch 2005)

Thus, while the evidence is not sufficiently long term, there is general acceptance that a comprehensive public health program can encourage healthy eating. Such an approach should encompass education and training, personal health services, mass media, community action, organisational development, environmental support and economic and regulatory measures.

Specific cancer prevention interventions

There have been some cancer prevention intervention trials that have examined the effectiveness of various dietary changes to prevent cancer or cancer precursors (such as adenomatous polyps). Generally the results from large-scale randomised controlled trials on the efficacy of dietary supplements to reduce the risk of cancer have been disappointing. For example, the Alpha-Tocopherol, Beta-Carotene Cancer (ATBC) Prevention Trial and Beta-Carotene and Retinol Efficacy Trial (CARET) both showed increased risk of lung cancer and mortality (Bowen et al. 2003; Leppala et al. 2000; Smigel 1996).

The Cochrane Database of Systematic Reviews have concluded that a daily intake of 1 g of dietary calcium may have a moderate protective effect on the development of colorectal adenomatous polyps, although this result is only based on two well conducted randomised controlled trails (Weingarten, Zalmanovici & Yaphe 2005). Dietary interventions to increase fibre have not shown a statistically significant reduction in the risk of colorectal cancer (Asano & McLeod 2002).

A large scale randomised controlled trial, the Women's Health Initiative, randomised women to a very low fat diet intervention or a usual fat diet (Prentice et al. 2006). Women on the low fat diet had a 9% lower incidence of breast cancer compared with the control group, but this result was not statistically significant. However in sub-group analyses, breast cancer rates were reduced by 22% among women who started with the highest fat intake (>37% energy from fat) and reduced their fat the most (to 24% after one year) (Stein 2006). Interestingly, there was suggestive evidence that the low fat diet had a more protective effect against oestrogen receptor positive breast cancer. Despite the lack of an apparent effect on colorectal cancer, adenomas were significantly reduced among the low fat diet group (Stein 2006).

In terms of dietary interventions for cancer survivors, there are only a few successful trials that suggest that there is hopeful progress in this area. A systematic review of 59 diet interventions for cancer patients and survivors (mostly with breast cancer) found non-statistically significant improvements in overall survival and survival from cancer (Davies et al. 2006). Most of the included studies in the review were too small and only provided limited data. A large randomised controlled trial, known as the Women's Intervention in Nutrition Study, found that the intervention group who decreased their dietary fat intake had a lower risk of recurrence of breast cancer (Chlebowski et al. 2005).

General practice

The role of general practice in chronic disease prevention is potentially important, given that 86% of the population have at least one visit to the general practitioner every year (RACGP 2005).

A review of primary care interventions found that moderate- or high-intensity counselling interventions, including the use of interactive health communication tools, can reduce consumption of saturated fat and increase intake of fruit and vegetables. Brief counselling of unselected patients by primary care providers appears to produce small changes in dietary behaviour, but its effect on health outcomes is unclear (Pignone et al. 2003; Steptoe et al. 2003).

The Royal Australian College of General Practitioners has produced three significant publications relating to the role of general practice and nutrition. The first, *Guidelines for preventive activities in general practice* (the 'red book') (RACGP 2005), focuses on the role of the GP within the consultation, recommending that all adult patients should be advised to follow the National Health and Medical Research Council's *Dietary guidelines for Australian adults*. (Nutrition advice for children should be based on the National Health and Medical Research Council's Dietary guidelines for children and adolescents in Australia.) Nutrition advice should be given at two-yearly intervals for adults and on every visit for children. Their more specific publication: *SNAP: A population health guide to behavioural risk factors in general practice* (RACGP 2004) provides more extensive information and recommendations regarding healthy nutrition (among other common lifestyle risk factors), focusing on a patient education and behaviour modification approach based upon the 5As (ask, assess, advise, assist, arrange). Lastly, their publication *Putting prevention into practice: guidelines for the implementation of prevention in the general practice setting* (the 'green book') (RACGP 2006) assists in developing systems in general practice to support prevention activities at the practice and consultation levels.

In further support of the GP's role in promoting good nutrition and obesity prevention, the Commonwealth Department of Health and Ageing, in the 2003/04 budget, funded the Lifestyle Prescriptions program (commonly known as Lifescripts). Lifescripts is being implemented through local divisions of general practice, promoting risk factor management in general practice and primary health care services. Lifestyle prescriptions

are tools for GPs to use when providing lifestyle advice to patients. Advice may be about quitting smoking, increasing physical activity, eating a healthier diet, maintaining healthy weight, reducing alcohol consumption, or a combination of these.

The policy context

Commonwealth, state and territory governments are becoming increasingly aware of the importance of healthy eating in the face of increasing trends to overweight and obesity among younger and adult Australians. This has resulted in a number of national strategic agendas including:

- *Healthy weight 2008, Australia's future*. The national action agenda for children and young people and their families (NOTF 2003).
- The Eat Well Australia approach under the SIGNAL National Public Health Partnership (now disbanded), which developed two key action plans: *An agenda for action for public health nutrition 2000–2010* (SIGNAL 2001), which seeks to set the agenda for and reflect national and state action on nutrition; and the *National Aboriginal and Torres Strait Islander nutrition strategy and action plan 2000–2010* (SIGNAL 2001), which sets a framework for action to respond to the significant diet-related illness experienced by these Australians.
- The Food Standards Code: food standards and regulation fall under the domain of the statutory authority Food Standards Australia New Zealand. This authority has responsibility for setting standards for the production and sale of food in Australia, including food labelling issues such as nutrition and health claims.
- Children's Television Standards: in Australia, food marketing operates under a system of co-regulation, with the Australian Communications and Media Authority having responsibility for the Children's Television Standards, which has some regulations for limiting television food advertising to children. The Advertising Standards Bureau administers the industry Codes of Practice developed by Free TV Australia and the Australian Association of National Advertisers, which add very little to the statutory regulations.

Several state and territory governments have taken steps to mirror or complement the Eat Well Australia approach, and there is clearly greater recognition of the importance of having a focus on healthy eating *and* physical activity as part of obesity and associated disease prevention (DHS 1997; Northern Territory Government 2001; Queensland Public Health Forum 2002; NSW Health 2002).

The key challenge now is to move beyond framework development and strategy setting into comprehensive program implementation.

Two key documents frame the international policy context around nutrition and cancer prevention:

- The World Health Organization *Global strategy on diet, physical activity and health* was developed through a series of consultations with stakeholders in response to a request from Member States at the 2002 World Health Assembly. This prevention-based strategy aims to 'reduce the risk of chronic non-communicable diseases across populations by addressing two of the main risk factors, diet and physical activity, through comprehensive, multi-sectoral interventions' (WHO 2004).

- The International Union Against Cancer's *Evidence-based cancer prevention: strategies for NGOs* highlights the need for policy and legislation as part of a multifaceted approach to improve the nutritional health of populations and individuals (UICC 2004).

Existing recommendations

In general, diet and nutrition recommendations to reduce cancer risk are consistent with the recommendations of Australian Government health authorities about healthy eating patterns. The Cancer Council Australia endorses the National Health and Medical Research Council *Dietary guidelines for Australian adults* (NHMRC 2003a), for older Australians (NHMRC 1999), and for children and adolescents (NHMRC 2003b) and concurs with the levels of intake of specific food groups recommended by the *Australian guide to healthy eating* (CDHFS 1998) and *Nutrient reference values* (NHMRC 2005).

The Cancer Council also acknowledges that its healthy eating recommendations are consistent with those of other chronic disease prevention groups, such as the National Heart Foundation (NHF 2002), with the exception that current research suggests that limiting alcohol consumption would help prevent cancer.

Aims

Our aims are to encourage the Australian population to:

- consume nutritionally adequate and varied diets based primarily on foods of plant origin such as vegetables, fruit, pulses and wholegrain cereals, as well as lean meats, fish and low fat dairy products
- ensure children have a nutritionally adequate and varied diet along similar lines with appropriate moderation to suit different age groups
- maintain a healthy body weight through a balance of food intake and physical activity.

The Cancer Council believes that a national and related state-based comprehensive public health program is required. Such a program would have an overweight and obesity focus that would incorporate healthy eating and physical activity with a chronic disease prevention focus encompassing cancer, diabetes and cardiovascular disease. This would require collaboration between key organisations in the government, non-government, medical, education, consumer, media and commercial sectors.

What needs to be achieved	How The Cancer Council Australia and its members (the state and territory cancer councils) will do this
Increased awareness of the link between nutrition and cancer among the general public and key health professional groups	<p>Monitor and clarify best evidence on the relationship between nutrition and cancer causation</p> <p>Ensure key messages are promoted to the public and relevant health professionals in publications, presentations, programs, media statements and where opportunities arise</p> <p>Promote and/or develop complementary primary health resources, specifically for general practice, to improve evidence-based interventions by health professionals</p>
Effective coordinated policy development and implementation	<p>Develop and maintain evidence-based policy positions about the relationship between nutrition and cancer to complement the Australian policy context</p> <p>Ensure effective and coordinated policy development and implementation</p>

What needs to be achieved	How The Cancer Council Australia and its members (the state and territory cancer councils) will do this
Social marketing campaigns that promote healthy eating	<p>Advocate for nationwide social marketing campaigns, that promote healthy eating across the life course, which are coordinated, sustainable and far reaching,</p> <p>Encourage the Australian, state and territory Governments to commit to long-term investment in promoting healthy eating</p> <p>Support and deliver effective community interventions at a local and state level to address healthy eating</p>
An increased capacity to monitor epidemiological trends	Support and conduct high quality epidemiological research further clarifying the relationship between nutrition and cancer
An increased capacity to monitor behavioural trends	<p>Support and conduct high-quality behavioural research further clarifying the barriers and enabling factors for people to adopt healthy eating</p> <p>Work towards a better understanding of the determinants of the obesogenic environment, to inform policy development</p> <p>Encourage the Australian Government to fund a comprehensive National Nutrition and Physical Activity Survey of both children and adults, which is conducted, as a minimum on a regular five-year basis</p>
More supportive environments that assist people to make healthy food choices	<p>Encourage the Australian Government to address the broader social and environmental determinants of poor nutrition, in particular:</p> <ul style="list-style-type: none"> • call for a ban of television food advertising to children • develop effective regulatory systems for decreasing the level of food marketing to children (including television food advertising and other forms of food marketing) • improved access to healthy food choices for people who are socially or geographically disadvantaged • develop effective regulatory systems for communicating accurate nutrition and health information on food labels • improve health literacy for reading food labels <p>Continue to support and promote the Parents Jury</p> <p>Participate on the Coalition on Food Advertising to Children</p> <p>Coordinate public health responses to relevant food regulatory issues, including changes to food labelling, through participation on the Coalition on a Healthy Australian Food Supply</p>
An increased capacity to know what works in relation to program delivery	<p>Undertake specific research and evaluation studies to:</p> <ul style="list-style-type: none"> • evaluate healthy eating interventions • gather more evidence relating to the economic evaluation of cancer prevention • lead national understanding of what works in relation to cancer prevention • identify barriers and enabling factors for implementation of these recommendations in general practice and other health settings

Note: Refer also to the action plans of the physical activity and obesity chapters when considering promotion of nutrition.

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