National Cancer Prevention Policy
2007–09
The Cancer Council Australia is Australia’s peak national non-government cancer organisation. Its members are the leading state and territory cancer councils, working together to undertake and fund cancer research, prevent and control cancer, and provide information and support to people affected by cancer.


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Abbreviations

AACR Australasian Association of Cancer Registries
ABS Australian Bureau of Statistics
ACCC Australian Competition and Consumer Commission
ACN Australian Cancer Network
AHRO Agency for Healthcare Research and Quality
AHTAC Australian Health Technology Advisory Committee
AICR American Institute of Cancer Research
AIHW Australian Institute of Health and Welfare
BCC basal cell carcinoma
BMI body mass index
BRCA breast cancer (associated gene)
BSE breast self-examination
CBE clinical breast examination
CDHAC Commonwealth Department of Health and Aged Care
CDHS California Department of Health Services
CDCP Centers for Disease Control and Prevention
CFMDCY Committee on Food Marketing and the Diets of Children and Youth
CGHFBC Collaborative Group on Hormonal Factors in Breast Cancer
COAG Council of Australian Governments
COSA Clinical Oncological Society of Australia
CTFPHC Canadian Task Force on Preventive Health Care
DHA Department of Health and Ageing (Australian Government)
DHAC Department of Health and Aged Care
DHS Department of Human Services (Victorian Government)
DRE digital rectal examination
FAP familial adenomatous polyposis
FOBT faecal occult blood test
GP general practitioner
HNPCC hereditary non-polyposis colorectal cancer
HPV human papilloma virus
HRT hormone replacement therapy
IARC International Agency for Research on Cancer
MCDS Ministerial Council on Drug Safety
MSAC Medical Services Advisory Committee
NEACA National Expert Advisory Committee on Alcohol
NACCHO National Aboriginal Community Controlled Health Organisation
NATSI Working Party National Aboriginal and Torres Strait Islander Working Party
NCCI National Cancer Control Initiative
NCSG National Cancer Strategies Group
NCSP National Cervical Screening Program
NHMRC National Health and Medical Research Council
NMSC non-melanoma skin cancer
NOTF National Obesity Task Force
NPHP National Public Health Partnership
PPV positive predictive value
PSA prostate-specific antigen
RACGP Royal Australian College of General Practitioners
SIGNAL Strategic Inter-Governmental Nutrition Alliance
TCCA The Cancer Council Australia
TRUS transrectal ultrasound
UICC International Union Against Cancer
USDHHS US Department of Health and Human Services
USDHW US Department of Health
UKFSSTI UK Flexible Sigmoidoscopy Screening Trial Investigators
USPSTF US Preventive Services Task Force
UV ultraviolet
VCCR Victorian Cervical Cytology Registry
VCTC VicHealth Centre for Tobacco Control
WCRF World Cancer Research Fund
WHO World Health Organization
The National Cancer Prevention Policy

Australia faces an unprecedented cancer control challenge.

Two years ago, the Australian Institute of Health and Welfare predicted that cancer incidence would increase by 31% between 2002 and 2011. This means we can expect more than 115,000 new cancer cases in 2011 (AIHW, AACR, NCSG & McDermid 2005). More recently, the Australian Burden of Disease Study showed cancer had overtaken cardiovascular disease as the nation’s biggest disease burden (Begg et al. in press).

Linking cancer incidence to population ageing—an accurate predictor of future trends—implies an even greater overall increase in cancer incidence in the years after 2011, as the percentage of Australians aged 65 and over is projected to double by 2051.

The problem will be compounded by a relatively smaller workforce able to support Australia’s inflated cancer patient base. On current trends, Australia’s obesity epidemic will also place an unprecedented burden on future cancer services. And people living with cancer will, quite rightly, have heightened expectations about the nation’s capacity to care for them, as gradual developments in cancer treatment continue.

The future would be considerably less daunting, however, if we could reach our potential to reduce cancer incidence through prevention and identify more cancers and precancerous conditions early, using measures already shown to be effective.

The latest AIHW data shows that around a third of cancer deaths in Australia are attributed to known avoidable risk factors. Many of the thousands of people who are successfully treated for cancer could also avoid, reduce or delay the distress of the cancer experience through appropriate prevention and early detection measures.

Yet as new research reconfirms that cancer is the disease Australians fear more than any other (Cameron et al. 2006), we continue to fall well short of our capacity to prevent cancer. Moreover, many of our missed opportunities to prevent cancer also contribute significantly to the overall community cost of chronic disease in Australia: five of the six key modifiable cancer risk factors—smoking, poor diet, physical inactivity, overweight/obesity and alcohol misuse—are all major risk factors for cardiovascular disease, while a number are also linked to diabetes, depression and asthma (see table below).

Table A.1 Risk factors for chronic disease

| Disease    | Poor diet | Physical inactivity | Tobacco use | Alcohol misuse | Overweight and obesity | High blood pressure | High cholesterol |
|------------|-----------|---------------------|-------------|----------------|------------------------|---------------------|----------------|----------------|
| Heart disease | ✓         | ✓                   | ✓           | ✓              | ✓                      | ✓                   | ✓              |
| Stroke     | ✓         | ✓                   | ✓           | ✓              | ✓                      | ✓                   | ✓              |
| Cancer     | ✓         | ✓                   | ✓           | ✓              | ✓                      | ✓                   | ✓              |
| Depression | ✓         | ✓                   | ✓           | ✓              | ✓                      | ✓                   | ✓              |
| Diabetes   | ✓         | ✓                   | ✓           | ✓              | ✓                      | ✓                   | ✓              |
| Asthma     | ✓         | ✓                   | ✓           | ✓              | ✓                      | ✓                   | ✓              |

Source: Adapted from AIHW 2002
The Cancer Council Australia’s National Cancer Prevention Policy 2007–09 aims to provide a blueprint for optimal cancer prevention and early detection in Australia for 2007–09, drawing on the latest evidence and exploring the impact, risk factors, policy context and effective interventions. It also provides an opportunity to reflect on the 2004–06 period.

In terms of immediate potential to reduce cancer death, the most significant individual measure was the Australian Government’s commitment to phase in a population-based bowel cancer screening program by 2008–09. We publicly welcomed this initiative as an election commitment in 2004 and the subsequent budget allocation in 2005–06. However, as 2007 begins, the program’s phase-in remains at an embryonic stage, and public information is limited on how federal and state/territory governments will work together to ensure it is built around a rigorous, quality-assured framework. The Cancer Council and its allies will continue to call for the Australian Government to work with all jurisdictions to deliver a program that is available to all Australians over 50 and adheres to the principles of best practice summarised in the bowel cancer screening chapter.

In the area of primary prevention, the Cancer Council welcomes the tobacco control progress made in all jurisdictions, particularly the restrictions on smoking in public places, which will reduce cancer risk among smokers and non-smokers. But, as explored in the tobacco chapter, a great deal more needs to be done before smoking loses its status as the cause of the most preventable cancer deaths in Australia.

Another key development was the discovery by a team led by Cancer Council Australia Vice-President Professor Ian Frazer of a vaccine for the human papilloma virus, which causes cervical cancer. The vaccine’s significance has motivated a new section on immunisation, which also examines hepatitis vaccination for preventing liver cancer. See the human papilloma virus and hepatitis B chapters in the immunisation section of the online edition of the National Cancer Prevention Policy 2007–09 (published in mid-2007 at www.cancer.org.au).

HPV immunisation should be particularly effective in developing countries where cervical cancer is prevalent due to the absence of population-based Pap screening. In Australia, however, the vaccine’s introduction must not confuse the public about the importance of a Pap screen program which has delivered the world’s lowest cervical cancer mortality rates and which remains essential for women in target age groups. The vaccine also exemplifies the need to develop policy in response to new evidence and emerging issues. So, too, does the Pap screen program itself, with indications that an increase in screening interval, from two to three years, warrants consideration in view of the latest evidence.

We welcomed the Government’s commitment to a national skin cancer awareness campaign, designed to reduce the impact of Australia’s most economically expensive cancer and the cause of more than 1500 deaths a year. There is a strong case for an ongoing commitment to such a campaign. Meanwhile, new evidence that excessive sun avoidance may cause vitamin D deficiency and increase autoimmune disease risk in some people again shows the importance of incorporating all the latest evidence into effective policy, as discussed in the skin cancer chapter.

Obesity/overweight, nutrition, physical activity and alcohol are explored with renewed vigour. While we are gradually winning the battle against preventable disease on some fronts, the obesity epidemic threatens a reversal of the long-standing trend of future generations’ life expectancy exceeding that of their parents. Unless steps are taken now to reduce obesity, particularly among children, bowel and postmenopausal breast cancer rates may increase significantly beyond what is predicted as part of population ageing.

One positive trend amid this concern is a growing recognition of general practitioners (GPs) as a pivotal part of chronic disease prevention. General practitioner groups have sought to
increase their understanding of managing disease risk and, in January 2006, the Council of Australian Governments announced a number of chronic disease prevention measures involving GPs. We focus on the role of GPs in cancer prevention on a chapter-by-chapter basis.

The range of issues covered in the National Cancer Prevention Policy 2007–09 reflects the diversity of evidence-based expertise among the external authors and the members of our Public Health Committee, listed towards the end of this book. My thanks to them all, in particular the Chair of the Public Health Committee, Ms Dorothy Reading at The Cancer Council Victoria, who oversaw the document’s production.

Cancer describes a complex range of malignancies. We all hope for a cancer-free future, for a cure for the disease that claims more Australian lives than any other cause. The evidence suggests that, rather than a single, miracle cure, reducing the impact of cancer will be the result of numerous separate developments targeting individual cancers.

Moreover, the evidence shows that the greatest potential gains for reducing cancer incidence and mortality in Australia are in primary prevention and early detection, using knowledge we already possess and which is articulated in the National Cancer Prevention Policy 2007–09.

Mrs Judith Roberts AO

President, The Cancer Council Australia

References


Section One: Preventable risk factors
Every day, around 43 Australians die from illnesses caused by smoking, equivalent to over 15,500 deaths every year. Unless action is taken now, Australians will continue to die from illnesses caused by smoking that could have been prevented.

Introduction

In Australia, cigarette smoking became widespread in the 20th century. At that time, tobacco was used by many societies, some of which had used it for many centuries; however, development of the manufactured cigarette in the late 19th century resulted in increased prevalence and consumption (Winstanley, Woodward & Walker 1995). In Australia, by the time of the First World War, tobacco smoking had become popular, particularly the smoking of manufactured cigarettes. By the end of the Second World War, the earliest date for which Australian data are available, 72% of men and 26% of women were smokers (Winstanley, Woodward & Walker 1995).

Since the 1970s, various bodies, including the International Union Against Cancer and more recently the World Health Assembly (the governing body of the World Health Organization), have taken action in recognition of the rising number of deaths caused by tobacco use. The first ever public health treaty on tobacco that outlines comprehensive tobacco control strategies, the Framework Convention on Tobacco Control, was passed by the World Health Assembly in May 2003. By January 2007, 143 member states of the World Health Organization were party to the convention, representing over 90% of the world’s population and making it one of the most extensive and rapidly implemented pieces of international law in history (WHO 2006).

Australia was one of the first nations to become active in tobacco control, having used a range of measures, including advertising restrictions, public information, price increases, and controls on smoking in public places, which have contributed to a significant reduction in the prevalence of smoking since the mid-1970s. Tobacco control remains one of the best investments governments can make to enhance the health and economic well-being of all Australians. While progress has been achieved in reducing the prevalence of smoking and protecting people from the harms of second-hand smoke, smoking continues to contribute to one of the highest levels of disease burden attributable to a preventable cause. Tobacco control must remain a high public policy priority, yet tobacco control initiatives are under-funded in the context of their demonstrated human and economic effectiveness. At the same time, efforts to reduce smoking prevalence are undermined by the tobacco industry, which continues to mislead, deceive and conceal the carnage caused by its deadly and addictive product, continues to pursue marketing strategies leading to high youth uptake, and obstructs measures designed to help reduce harm from smoking and exposure to second-hand smoke.
The link between tobacco and cancer

Pathologists and other medical practitioners first observed a rise in the incidence of lung cancer in the 1920s and 1930s. Research published in 1950 confirmed that tobacco smoking was a cause of death and disease, and reports by the Royal College of Physicians in London in 1962 and the US Surgeon General in 1964 resulted in acknowledgment by some governments that smoking was a cause of disease (Winstanley, Woodward & Walker 1995). In a 2004 review the US Surgeon General concluded that there was sufficient evidence to infer a causal relationship between smoking and cancer at the following sites: bladder, cervix, kidney, larynx, lung, oesophagus, oral cavity and pharynx, pancreas and stomach; and between smoking and acute myeloid leukaemia.

There is well-documented evidence of the health effects of exposure to second-hand smoke or ‘passive smoking’. In 1986 a major conclusion of a report by the US Surgeon General was that involuntary smoking is a cause of disease, including lung cancer, in healthy non-smokers. This conclusion was supported by reviews published in the same year by the US National Research Council, the International Agency for Research on Cancer, and the Australian National Health and Medical Research Council (USDHHS 2006; Winstanley, Woodward & Walker 1995). In 1992 a US Environmental Protection Agency report classified cigarette smoke as a class A carcinogen and concluded that exposure to second-hand smoke causes lung cancer (USDHHS 2006). The 2006 report of the US Surgeon General on involuntary exposure to tobacco smoke reviews evidence that reaffirms and strengthens the findings of the 1986 report, concluding that exposure to second-hand smoke causes lung cancer and also that there is no risk-free level of exposure to second-hand smoke (see later in this chapter for data on the incidence of cancer and mortality caused by smoking in Australia).

The impact

In Australia, tobacco smoking kills more than 15,500 Australians each year (Begg et al. in press). As shown in the Figure 1.1 each year more Australians are killed by tobacco than by breast cancer, AIDS, traffic and other accidents, murders and suicides combined (AIHW 2006; Begg et al. in press).
Figure 1.1 Number of Australians who died in 2004 because of smoking compared with selected other causes

<table>
<thead>
<tr>
<th>Causes of death</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls</td>
<td>1,558</td>
</tr>
<tr>
<td>Drowning</td>
<td>197</td>
</tr>
<tr>
<td>Transportation accidents</td>
<td>1,689</td>
</tr>
<tr>
<td>Other accidents</td>
<td>1,335</td>
</tr>
<tr>
<td>Suicide</td>
<td>2,098</td>
</tr>
<tr>
<td>Homicide</td>
<td>168</td>
</tr>
<tr>
<td>Breast cancer (females)</td>
<td>2,614</td>
</tr>
<tr>
<td>AIDS</td>
<td>116</td>
</tr>
<tr>
<td>Smoking*</td>
<td>15,511</td>
</tr>
</tbody>
</table>

* Note that the estimate for deaths attributable to smoking is based on data for 2003.

Sources: AIHW 2006; Begg et al. in press

The Australian Burden of Disease Study quantifies the contribution to health status of mortality, disability, impairment, illness and injury arising from tobacco smoking and other risk factors. The study found that tobacco is one of the leading risk factors for disease, being responsible for 7.8% of the total burden of disease in Australia. Only high body mass creates a greater burden of disease (8.6%) (Begg et al. in press).

Most smokers begin smoking when they are young, and many remain addicted to smoking for life (Winstanley, Woodward & Walker 1995). As a consequence of their addiction, in Australia one in two lifetime smokers will die from diseases caused by tobacco, and more than 22% of these deaths are in people aged under 65 years (AIHW 1998).

Tobacco smoking increases the risk of cardiovascular disease, lung disease and cancer, as well as a number of other conditions (USDHHS 2004). Many of the diseases caused by smoking are chronic and disabling, and it has been estimated that in the US, for every premature death caused by smoking in a given year, there were at least 20 smokers living with a smoking-related disease (USDHHS 2004). Table 1.1 lists the cancers caused by smoking.

Tobacco smoking is a leading cause of cancer, and was estimated to have directly caused 10,592 new cases of cancer (12% of all new cases of cancer) and 7,820 deaths (21.5% of cancer deaths) in Australia in 2001. Between 1991 and 2001, the incidence rate for men of cancers attributable to smoking fell by an average of 1.4% per year, while the rate for women rose by 0.7% per year. These differences are attributable to differences in the prevalence of smoking among Australian men and women over the past 30 years and the time lag between exposure to carcinogens and diagnosis of cancer (AIHW & AACR 2004).
Table 1.1 Cancer site and percentage of new cancers attributable to smoking in Australia in 2001

<table>
<thead>
<tr>
<th>Site</th>
<th>Males (%)</th>
<th>Females (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>89</td>
<td>70</td>
</tr>
<tr>
<td>Larynx</td>
<td>69</td>
<td>60</td>
</tr>
<tr>
<td>Oral cancers</td>
<td>52</td>
<td>42</td>
</tr>
<tr>
<td>Renal (kidney) pelvis</td>
<td>51</td>
<td>43</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>50</td>
<td>41</td>
</tr>
<tr>
<td>Anus</td>
<td>39</td>
<td>29</td>
</tr>
<tr>
<td>Bladder</td>
<td>38</td>
<td>28</td>
</tr>
<tr>
<td>Vulva</td>
<td>–</td>
<td>32</td>
</tr>
<tr>
<td>Cervix</td>
<td>–</td>
<td>19</td>
</tr>
<tr>
<td>Penis</td>
<td>21</td>
<td>–</td>
</tr>
<tr>
<td>Pancreas</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td>Kidney</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Stomach</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Colon/rectum</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Sources AIHW & AACR 2004; Chao et al. 2000; USDHHS 2004

The economic consequences of tobacco use in Australia have been examined, with the total social costs in 1998–99 having been estimated at $21 billion (Collins & Lapsley 2002). It has also been estimated that the health system costs for lung cancer (85% of which is attributable to tobacco smoking) amounted to $107 million in 1993–94 (Mathers et al. 1998). Smoking causes very high levels of ill health and premature death among Aboriginal and Torres Strait Islander peoples, which adds to the social costs among these communities (Briggs, Lindorff & Ivers 2003). In Australia in 2001–02, smoking accounted for more than 291,000 hospital episodes per year, at a cost of $682 million (Hurley 2006).

The challenge

Adults

The prevalence of smoking among Australian adults has been measured by a number of different surveys: the National Drug Strategy Household Survey conducted by the Australian Institute of Health and Welfare (AIHW 2005); Smoking and Health Surveys conducted by The Cancer Council Victoria (White, Hill et al. 2003); National Health Surveys (ABS 2006); and National Aboriginal and Torres Strait Islander Surveys conducted by the Australian Bureau of Statistics (ABS 1994). Consistent trends have been observed, despite minor variations in methods between the surveys, so trends over time rather than specific figures are important foci for policy development (White, Hill et al. 2003).

In 2004 in Australia, 17.4% of people aged 14 years or older were daily smokers, with a further 3.9% of the population reporting weekly or less than weekly smoking (AIHW 2005). The recent decline in the number of daily smokers among men (18.6%) and women
Section One: Preventable risk factors

(16.3%) continues the trends observed over the last 25 years (White, Hill et al. 2003; AIHW 2005).

It has been noted that those smokers who regard themselves as ‘occasional’ or ‘social smokers’ may make up 29% of all smokers. This segment of smokers holds different attitudes towards smoking and quitting from other smokers, which has implications for campaigns and messages for this group of smokers (Morley et al. 2006).

There are specific populations for which smoking rates remain significantly higher than average, including populations that are socio-economically disadvantaged, Aboriginal and Torres Strait Islander peoples and male Australians born overseas in particular countries.

**Socio-economically disadvantaged populations**

The prevalence of smoking in Australia in 2001 among lower blue collar workers (36%) remained higher than among upper white collar workers (16%), despite the significant declines in all occupational groups since 1980 observed in surveys of people aged 18 years or older by The Cancer Council Victoria (White, Hill et al. 2003).

**Aboriginal and Torres Strait Islander peoples**

The prevalence of smoking remains very high among Aboriginal and Torres Strait Islander peoples. The *National Aboriginal and Torres Strait Islander health survey* of 2004–05 indicated that the prevalence of smoking in people aged 18 years and over has remained unchanged at 50% since 1995 (ABS 1994); however, the smoking rates among some remote Aboriginal and Torres Strait Islander communities are much higher (Ivers 2001). After adjusting for age differences, in 2004 Aboriginal and Torres Strait Islander people aged 18 years and over were more than twice as likely as non-Indigenous Australians to be smokers (AIHW 2006). A 2002 survey reported a smoking prevalence of 59% among Aboriginal health workers in New South Wales (Mark et al. 2005).

Potential contributors to the higher prevalence of smoking among Aboriginal and Torres Strait Islander peoples include (Briggs, Lindorff & Ivers 2003; AGDHA 2005):

- the effects of historical colonisation and dispossession (disruption and erosion of language and culture, creation of unhealthy living and social conditions, devaluation of cultural responses to health problems, general subordination due to racism)
- socio-economic disadvantage (the roles of lower levels of education, lower levels of employment and lower weekly income)
- cultural beliefs and strong links to a traditional lifestyle (recognition of homelands, believing in the important role of elders, and English not being a first language have been linked to higher prevalence of tobacco use)
- enjoyment and addiction (similar to their roles in the maintenance of smoking among non-Indigenous people)
- social contexts and pressures (role of smoking in becoming accepted as part of the social group, roles of boredom, stress and anxiety).

A lack of knowledge on the health effects of tobacco does not appear to be a major factor in the higher prevalence of smoking among Aboriginal and Torres Strait Islander peoples (Briggs, Lindorff & Ivers 2003).
Australians born in particular countries

Smoking rates among Australians born in Australia and in other countries were measured in the National Health Survey 2004–05 for people aged 18 years and over (ABS 2006). The overall prevalence among men was 24.2%, but smoking was more prevalent among men born in North Africa and the Middle East (31.9%) and among men born in South East Asia (28.6%). For women born in Oceania (excluding Australia) the prevalence was 26.3%, compared with an overall prevalence among women of 18.4% (ABS 2006).

Teenagers

Among secondary students (Table 1.2), rates of smoking decreased in the late 1980s, and then remained relatively stable in the 1990s (Hill, White & Letcher 1999). Among older students (those aged 16–17 years), the significant decrease among males and females between 1999 and 2002 was the first seen in this age group since 1990 (White & Hayman 2004). Among students aged 12–15 years, the prevalence of smoking also declined between 1996 and 2005.

Table 1.2 Trends in rates of smoking among Australian secondary school children between 1984 and 2005: proportion (%) of students who smoked in the last seven days (age adjusted)

<table>
<thead>
<tr>
<th>Year</th>
<th>Girls 12–15 years</th>
<th>Boys 12–15 years</th>
<th>Girls 16–17 years</th>
<th>Boys 16–17 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>20</td>
<td>19</td>
<td>32</td>
<td>28</td>
</tr>
<tr>
<td>1987</td>
<td>14</td>
<td>13</td>
<td>30</td>
<td>26</td>
</tr>
<tr>
<td>1990</td>
<td>14</td>
<td>13</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>1993</td>
<td>16</td>
<td>15</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>1996</td>
<td>16</td>
<td>16</td>
<td>32</td>
<td>28</td>
</tr>
<tr>
<td>1999</td>
<td>16</td>
<td>15</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>2002</td>
<td>12</td>
<td>10</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>2005</td>
<td>7</td>
<td>7</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

Sources: Hill, White & Letcher 1999; White & Hayman 2004; White & Hayman 2006
Note that young people who had left school were not included in the national surveys on which this table is based.

There were an estimated 4.3 million ex-smokers among the 16.4 million Australians aged 14 and over in 2004 (AIHW 2005). However, there were still an estimated 2.9 million Australians who smoked on a daily basis in 2004 (AIHW 2005).

Other challenges

The prevention of more than 17,000 premature deaths in 1998 in Australia can be attributed to a range of successful tobacco control measures that delivered declines in smoking from the early 1970s (DHA 2003). However, with almost one in five Australians continuing to smoke, the nation faces a significant challenge to further reduce smoking rates and avert major social and economic costs to the community.

Compounding the need to further reduce smoking rates is an expected increase in overall cancer incidence rates in Australia of around 30% over the next five to 10 years as a result of population ageing. This trend is likely to continue as the population ages. Reducing smoking prevalence now would lead to significantly fewer overall cancer diagnoses.
in the longer-term future, when healthcare services in Australia are likely to be under unprecedented pressure owing to demographic change.

Despite the progress made in Australia to date, significant challenges to achieving continued reductions in tobacco-related harm remain. These challenges include the disproportionate burden of harm among disadvantaged populations, attitudes that undermine effective tobacco control, the influence of the tobacco industry, and a reluctance from governments at all levels to take measures to reduce tobacco use commensurate with the economic and social damage caused by smoking.

Disproportionate tobacco burden

As documented elsewhere in this chapter, socially disadvantaged population groups bear a disproportionately high tobacco burden in Australia. Evidence increasingly shows that, as well as causing a growing inequity in health status, smoking among these groups contributes to a cycle of poverty and disadvantage. Recent research on financial deprivation and smoking has shown that disadvantaged smokers experience financial hardship as a result of tobacco use, and are more likely to want to quit smoking, but less likely to succeed in quitting (Siahpush, Heller & Singh 2005).

Attitudes that undermine effective tobacco control

Resistance to progressive tobacco control can be based on a set of attitudes that are clearly unsupported by evidence or are based on facile excuses for inaction, yet some of which are nonetheless cited by social commentators and policy makers to discourage efforts to reduce the tobacco burden. An important part of ‘de-normalising’ a habit that causes the extent of preventable death and disease documented in this chapter is to counter, using evidence, the inaccurate framing of tobacco issues cited as a justification for tobacco control complacency. Some of the salient catchphrases used to argue against an increased commitment to tobacco control can be readily debunked in view of the evidence as follows.

‘We have done everything possible to control tobacco, apart from banning tobacco altogether.’

This view is contradicted by the evidence, which shows that a comprehensive policy commitment and sustained campaign funding are highly effective in reducing smoking rates. In California, which introduced comprehensive tobacco control measures in 1988, smoking rates have decreased by approximately 38%, from 22.7% to 14% (CDHS 2006). Jurisdictions such as Canada now have daily smoking rates as low as 13.5% (Canadian Tobacco Use Monitoring Survey 2006). There is every reason to believe that, with appropriate measures, smoking rates in Australia could be reduced to less than 5%. None of the required measures would involve banning tobacco products.

‘Australia is doing OK already’ or ‘Australia is doing better than anyone else.’

While Australia should be acknowledged as a world leader in tobacco control policy given its reforms over the past three decades, more than 17% of Australians still smoke every day: which corresponds to almost one in five people incurring a 50% risk of dying as a result of smoking, half of them in middle age. Despite substantial reductions in smoking rates over the past 30 years, tobacco use remains one of the leading preventable causes of disease. Over 15,500 Australians die from smoking-caused diseases each year, and lung cancer rates in women continue to rise.
‘It’s a legal product.’

Tobacco is a commercial and regulatory anomaly. Smoking causes a higher disease burden than the combined use or misuse of all other ‘legal products’ that are rigorously regulated for safety reasons, including over-the-counter drugs, prescription medicines, pesticides, alcohol and motor vehicles. On the basis of demonstrated harm, tobacco products are also under-regulated in comparison with government treatment of other environmental carcinogens and hazardous consumer products.

‘Smoking provides economic benefits to government and society in general.’

Evidence indicates the opposite: tobacco control is one of the best investments governments can make. Independent economic analyses clearly demonstrate that smoking has a high net social and economic cost to the community. Similar analysis has also shown that a reduction in smoking rates would not harm the economy. There is also objective evidence for a strong return on investment in tobacco control. The most recent Department of Health and Ageing analysis on this issue found that every $1 spent on tobacco control yields $2 in savings, and the consultancy firm Applied Economics concludes that tobacco control yields better gains than any other public health program expenditure, with a benefit to cost ratio of 50:1 (Applied Economics 2003).

‘Smoking is an adult choice.’

The vast majority of smokers start smoking while in adolescence, becoming addicted before they are mature enough to make an adult decision and fully understand the consequences of nicotine addiction and the harms of smoking (Schofield et al. 1998; Winstanley, Woodward & Walker 1995). Almost all smokers also say that they regret starting smoking (Fong et al. 2004). Evidence also shows that most adult smokers are not fully aware of the dangers of smoking, with a recent survey finding that while two-thirds identified lung cancer as smoking-related, only one-quarter knew that smoking caused heart disease and fewer than 10% understood the risk of emphysema, stroke and vascular problems (Quit Victoria 2006). Around 90% of smokers report regretting ever having started (Fong et al. 2004).

‘Tobacco control is part of a nanny state.’

The argument that government action to reduce smoking rates is restricting personal freedoms with risk-averse, patronising public policy is debunked by the evidence outlined against the five arguments discussed above. In addition, most tobacco control measures are designed to support decisions that people are already making. Every year, 30% to 40% of smokers attempt to quit, but only one in 10 attempts to quit is successful. Tobacco control measures reduce relapse rates and help intending quitters to break their addiction. Measures are mainly about removing inducements to smoke or providing information, support and encouragement to quit.

Governments also have a responsibility to protect non-smokers from the increasingly evident harms of environmental tobacco smoke and to reduce the economic burden, borne by the wider community, imposed by smoking. The restrictions on smokers imposed over recent years have attracted overwhelming community support (VCTC 2002).

Tobacco industry influence

While coordinated efforts to reduce the disease burden of tobacco have made Australia a challenging market for the tobacco industry compared with nations where there are fewer controls, almost one in five Australians continues to smoke, with Australian households spending more than $10 billion on tobacco products per year (ABS 2005).
Tobacco products are among the top 10 best-selling items for a range of retailers, including supermarket chains, grocery stores, petrol stations and newsagents. The tobacco industry in Australia was estimated to be worth $6.2 billion in 2002 (VCTC n.d.), with 52 brands of cigarettes available for sale in June 2003 (Australian Retail Tobacconist 2003). Therefore, tobacco companies are very well-resourced to counter attempts to reduce smoking rates; the industry continues to exploit loopholes in tobacco control regulations and to engage high-powered legal firms when called to account in the courts. The tobacco industry continues to try to court policy-makers and to adopt a stance of legitimacy and good corporate citizenship, despite a proven record of deceptive conduct.

Effective interventions

Comprehensive tobacco control strategies, if sufficiently funded, work to reduce tobacco consumption among both adults and teenage smokers (VCTC 2002). This conclusion is based on studies from the World Health Organization (WHO 1998) and the US Centers for Disease Control and Prevention (CDCP 1999; CDCP 2000; CDCP 2001), and a review carried out for the World Bank (Jha & Chaloupka 1999).

In Australia over the last 30 years an estimated $8.6 billion has been saved through deaths avoided and declines in illness and disability due to reduced tobacco use (DHA 2003). It is estimated that $2 has been saved on health care for each $1 spent on tobacco control programs to date, with total economic benefits exceeding expenditure by at least 50 to 1. Specific strategies include increasing the prices of tobacco products and changing social attitudes to smoking through regulation and hard-hitting media campaigns. The precise impact of any specific strategy has been difficult to assess, as many have been implemented simultaneously or partially, or in an ad hoc way without comprehensive evaluation (Chapman 1993). Moreover, all have been opposed and undermined by tobacco industry activity.

Pivotal to a strategic and coordinated approach to smoking reduction in Australia is the willingness of governments to commit to, and seek to attain, specific smoking prevalence targets. Targets can only be achieved if adequate resources are committed to tobacco control measures in the long term. Evidence shows that it is feasible to achieve a decline of 1% per annum in the prevalence of smoking if tobacco control measures are well-funded and implemented (CDCP 2001). The speed of the decline depends on government action in ensuring adequate spending levels as well as appropriate regulation.

The Cancer Council encourages the Australian Government to set targets for smoking prevalence for Australian adults, children and disadvantaged groups, and to allocate adequate funds for comprehensive tobacco control programs to achieve these targets. In order to further reduce the unacceptable burden of smoking in Australia, governments and other institutions involved in public policy will need to build on the demonstrated success of tobacco control strategies employed in Australia over the past three decades. Priorities for further action are outlined below.

Continual innovation in tobacco control is required to keep pace with changes in the smoking-related environment. For example, a growing evidence base showing the increasing extent of disease linked with smoking demonstrates the need for tobacco control programs that are commensurate with the burden smoking imposes on the community. Accumulated evidence showing which approaches to tobacco control are the most effective should inform government policy. Policy-makers must also be able to react quickly to the tobacco industry’s attempts to exploit loopholes in measures designed to reduce smoking rates. There are a number of other examples showing the need for flexible,
progressive solutions, as well as evidence that indicates where public policy for tobacco control in Australia is inadequate.

All jurisdictional governments in Australia have committed, in principle, to the following general approaches to tobacco control, as each priority is to some extent incorporated into the National Tobacco Strategy. However, implementation of the strategy has been gradual, and the funding commitment is not sufficient to convert policy into effective practice. The re-establishment of a multi-jurisdictional advisory body drawing on independent expertise from outside the bureaucracies, such as the former Ministerial Tobacco Advisory Group, would help to guide the implementation of the National Tobacco Strategy.

The Cancer Council Australia outlines the major areas where reform is required below. Rejection of tobacco industry donations by all political parties, while not explored as a specific tobacco control measure below, would also be a significant step in ‘de-normalising’ smoking and challenging the legitimacy of the tobacco industry.

Recommended funding

Despite the well-documented successes of comprehensive strategies to address tobacco use and the resultant savings in public finances (DHA 2003), government funding of tobacco control in Australia is well below optimal. The US Centers for Disease Control has developed best practice guidelines for the implementation of comprehensive tobacco control programs (CDCP 1999). These guidelines draw on evidence-based analyses of programs implemented in California, Massachusetts and other US states. The guidelines outline nine program components and estimate a range of annual costs. For a state with a population under three million people the cost would be US$7–20 per capita, for populations between three and seven million the cost would be US$6–17 per capita, and for populations over seven million (e.g. Australia-wide) the cost would be US$5–16 (A$7–21). Recommendations from the VicHealth Centre for Tobacco Control on how comprehensive tobacco control programs should be implemented in Australia, based on the Centers for Disease Control best practice guidelines (CDCP 1999), are summarised in Table 1.3 (VCTC 2003).

<table>
<thead>
<tr>
<th>Component</th>
<th>A$ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community programs</td>
<td>23.25</td>
</tr>
<tr>
<td>Chronic disease programs</td>
<td>1.15</td>
</tr>
<tr>
<td>School programs</td>
<td>1.65</td>
</tr>
<tr>
<td>Enforcement</td>
<td>12.25</td>
</tr>
<tr>
<td>Statewide programs</td>
<td>13.07</td>
</tr>
<tr>
<td>Counter marketing</td>
<td>64.00</td>
</tr>
<tr>
<td>Cessation programs</td>
<td>59.35</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>174.69</strong></td>
</tr>
<tr>
<td>Surveillance and evaluation</td>
<td>8.00</td>
</tr>
<tr>
<td>Administration and management</td>
<td>11.80</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>194.49</strong></td>
</tr>
</tbody>
</table>

Source: VCTC 2003
In 2007, given estimated costs of $200 million and an Australian population of 20.7 million, the recommended tobacco control measures would cost around A$10 per head. The Better Health for All Australians Initiative from the Council of Australian Governments (federal, state and territory governments) provides an opportunity to meet the recommended levels of investment for tobacco control with its stated intent to: ‘promote healthy lifestyles; support early detection of lifestyles risks and chronic disease through a new Well Person’s Health Check (available nationally to people around 45 years old with one or more identifiable risks that lead to chronic disease); and support lifestyle and risk modification through referral to services that assist people wanting to make changes to their lifestyle, for example, give up smoking’ (COAG 2006). Disappointingly, the initial round of funding in 2006 did not include additional funding for tobacco control initiatives, limiting its impact on cost-effective approaches to health improvement. The Cancer Council and its allies working across all nine jurisdictions in Australia will continue to encourage government to fund evidence-based tobacco control programs on the basis of their potential to deliver optimal social and economic gains to the community.

**Social marketing campaigns**

The National Tobacco Campaign of the late 1990s (‘Every Cigarette Is Doing You Damage’) was the first coordinated, multimedia anti-smoking campaign that was run on a national basis and supported by related activities in jurisdictions (e.g. state Quit programs etc.). An independent economic evaluation of the campaign, based on a rigorous analysis, calculated that the $7.1 million invested in the program by the Australian Government in 1997 yielded full cost offsets to the whole economy of $24.2 million, meaning that the campaign paid for itself three times over. Direct savings to the Australian Government alone were calculated to be $10.9 million within the year of its implementation (DHA 2000). Yet the campaign has not been run on a national basis for more than seven years, despite the clear economic benefits and potential for larger long-term returns. Moreover, evidence shows that without recurrent commitment to widely accessible information about the risks of tobacco use, declines in smoking rates can stall or are at risk of reversing.

Based on the success of the National Tobacco Campaign, and adjusting for inflation, there is a clear economic case for committing $11 million on a recurrent basis to a new, evidence-based social marketing campaign. Such a campaign would have a major impact on bringing smoking rates closer to a feasible 5% of the Australian population and add to the success of other tobacco control measures.

**Elimination of tobacco promotion**

When responding to the Government’s review of the *Tobacco Advertising Prohibition Act*, The Cancer Council Australia and allies presented evidence of tobacco industry activity that contradicted the spirit of the Act and, in some cases, represented potential breaches. On the basis of that evidence, the Cancer Council put forward a number of recommendations for amending the Act. However, these were not adopted, and the review committee concluded that no amendments would be made to the Act. An evidence-based case remains, however, for amending the Act to enact and enforce the following additional restrictions on tobacco promotion. Recommended measures include:

- amend the definition of ‘tobacco advertisement’ to include the use of imagery that associates smoking with a desirable lifestyle, and expand the definition of ‘tobacco product’ to include cigar and cigarette cases (including the slips introduced to conceal graphic warnings on cigarette packets)
- prohibit all advertising and display at the point of sale
• address smoking in films: for example, classify films with positive depictions of smoking, and run anti-smoking advertisements before cinema screenings of such films

• prohibit the giving of free samples, gifts and other promotional offers aimed at boosting tobacco sales

• prohibit ‘mobile retailing’: sales of tobacco products should be restricted to places that operate as shops, and shops only, at all times

• prohibit vending machines

• require all tobacco products to be sold only in prescribed generic packaging that does not have any colours or branding or information other than that prescribed by regulation

• regulate Internet advertising and sales, direct mail/sending of catalogues, and mail order

• make it an offence to encourage/employ someone else to run a tobacco advertisement in breach of the Act

• remove exemptions for tobacco advertisements on international flights in and out of Australia

• prohibit marketing outside Australia by Australian companies that would be illegal in Australia

• prohibit false or misleading statements by manufacturers about the addictiveness or health effects of smoking or exposure to smoke

• require tobacco manufacturers to report on all promotional activities and expenditure and on sales volume

• tighten provisions relating to magazines imported from countries with fewer restrictions on tobacco advertising in periodicals.

There are a number of other recommended amendments, indicating both the extent to which the Act is limited in achieving its stated aims and the scope for the tobacco industry to continue to promote its products. The effectiveness of the Tobacco Advertising Prohibition Act is also limited by the relatively small penalties associated with breaches, particularly in light of the potential revenues associated with recruiting new smokers through illegal marketing strategies.

While a strengthened Tobacco Advertising Prohibition Act would be the appropriate legislative instrument to further restrict tobacco promotion as described, it is unlikely that government would call for another general review of the Act in the near future, thus other approaches to achieve similar results should be considered. For example, direct approaches to supermarket chains to remove tobacco products from sight have the potential to further ‘de-normalise’ smoking and assist quitters who are at higher risk of relapse when cigarettes are in plain view and more readily accessible. In the meantime, The Cancer Council Australia will continue to make the case for incremental amendments to the Act to phase in the tighter measures described above.

Australia also needs to ensure that the protocols of the World Health Organization Framework Convention on Tobacco Control, which was ratified here in 2004, are observed in the domestic environment, in particular for eliminating loopholes allowing for tobacco industry sponsorship of sporting events.

Product regulation (short-term goals as minuted)

As discussed later in this chapter, tobacco products are a regulatory anomaly in view of the burden that their unregulated availability imposes on the community. All government jurisdictions in Australia have agreed to the principle of reducing smoking rates through
improved regulation, by collectively endorsing the National Tobacco Strategy (see later in this chapter). However, the slow progress of implementation has increased the urgency of tobacco regulation priorities, which include:

- imposing penalties for misleading statements (see recommended amendments to the Tobacco Advertising Prohibition Act)
- banning additives that aid palatability and addictiveness
- making reduced ignition propensity cigarettes (shown to significantly reduce fire risk) mandatory
- banning filter venting
- making detailed information on the content of all tobacco products publicly available (possibly on a public domain website)
- imposing a ‘polluter pays’ requirement/levy on industry.

**Real price increases**

As articulated in the National Tobacco Strategy (see later in this chapter), imposing price increases on tobacco products through taxation has been shown to directly reduce smoking rates, and is therefore endorsed as evidence-based tobacco control policy. Government revenue derived from increased tobacco tax should fund additional smoking cessation services, to help ensure that people on lower incomes, who already bear a disproportionate tobacco burden, are better supported to quit smoking.

**Accountability**

Litigation is an increasingly effective way to help make the tobacco industry accountable for the death and disease caused by its products and to obtain funds to support tobacco control measures (Advocacy Institute 2005). The achievements of litigation include (Daynard 2003):

- disclosure of documents that demonstrate the intent of the tobacco industry to target children; deliberately mislead scientists, politicians, and customers about the lethal and addictive nature of their products; and to conspire with smugglers and money launderers around the world
- verdicts against tobacco companies in tobacco cases in the US, made possible by the above-mentioned documents, involving punitive damages of millions or billions of dollars have added to the industry’s confusion and loss of legitimacy and, in the US, the increasing possibility of bankruptcy further weakens the industry’s position politically and in the financial community
- the first stirrings of responsible behaviour by tobacco companies (Philip Morris now concedes on its website that cigarette smoking is addictive and causes lung cancer and other diseases)
- media coverage and public discussions about tobacco lawsuits, which educate the community about addiction and disease caused by smoking.

In Australia the Australian Competition and Consumer Commission has had some success in enforcing the law against the tobacco industry with respect to its deceptive practices, with the industry agreeing to court-enforceable undertakings to remove ‘light’ and ‘mild’ brands from sale and pay for corrective advertising. The industry also promptly withdrew ‘split packs’ (see elsewhere in this chapter), which represented a breach of packaging regulations, following prompt action from the commission. However, the wealthy tobacco industry is a formidable legal opponent, and the Australian Competition and Consumer
Commission lacks sufficient funds to effectively bring the industry to account. The Australian Government should adequately fund the Australian Competition and Consumer Commission to take on the tobacco industry.

**Access to smoking cessation aids**

The Cancer Council Australia recommends improved access to smoking cessation aids to an extent commensurate with the damage caused by smoking and the percentage of smokers who would like to quit. Implementation of the other measures articulated in this section would also require an increase in the availability of smoking aids to help ensure an optimal return on investment in initiatives such as social marketing campaigns. A range of products and services needs to be available to support intending quitters, such as counselling, information and education, and nicotine replacement and pharmacological products.

Improved tobacco control policy requires:

- promotion of tobacco-dependence treatment as an integral component of cost-effective health care
- increased government funding of the delivery and promotion of non-drug smoking cessation support services, including Quitlines
- increased funding for programs to educate and prompt healthcare providers to identify and advise patients who smoke to quit, and to refer them to appropriate support services
- implementation of subsidy and access arrangements for pharmacological interventions, to help ensure that treatment is equitable and cost-effective
- tailoring of cessation support services for disadvantaged and high-risk groups, such as Aboriginal and Torres Strait Islander people
- introduction of a Medicare rebate for general practitioners to counsel patients about smoking cessation or for referral to the Quitline or other effective services.

**Smoke-free environments**

The restrictions on smoking in public places that gained momentum in the mid-to-late 1980s with bans on smoking in Australian workplaces and domestic flights have extended to a number of environments, with evidence showing a significant decrease in the health risks encountered due to second-hand smoke. Smoke-free environments also help to ‘de-normalise’ smoking and encourage smokers to quit. While all Australian jurisdictions have adopted some bans on smoking in public places, the pace of reform varies, and opportunities for significant improvement remain. In order for restrictions to reach their potential to adequately protect all individuals from the dangers of second-hand smoke, tightening of laws is required in all jurisdictions, with evidence-based recommendations to:

- eliminate the loopholes/exemptions exploited by pubs and clubs
- eliminate ‘high-roller’ room exemptions (e.g. in casinos, where wealthy patrons are permitted to smoke in enclosed spaces despite the risks to staff)
- ban smoking in outdoor dining areas
- create smoke-free campuses/higher learning institutions.

There is also a clear case for banning smoking in cars carrying children and pregnant women.
**Tobacco control strategy for Aboriginal and Torres Strait Islander peoples**

The prevalence of smoking among Aborigines and Torres Strait Islanders is around 50%, more than 2½ times the smoking rate of non-Indigenous Australians. Evidence shows that smoking among Aborigines and Torres Strait Islander people is a significant cause of increased cancer mortality and other chronic disease. Indigenous Australians are more than twice as likely to die within five years of a cancer diagnosis as non-Indigenous cancer patients, in large part because of the poor prognosis of cancers caused by smoking (Condon et al. 2005).

The cycle of poverty and disadvantage exacerbated by smoking (discussed elsewhere in this chapter) is particularly acute among Aborigines and Torres Strait Islander people. Despite the importance of smoking in the crisis in Indigenous health, efforts to address the issue have been substantially under-funded. Yet evidence shows that measures to reduce tobacco use, such as information, education and nicotine replacement therapy, can work in Indigenous communities if adequately funded and promoted in a culturally appropriate framework (Briggs, Lindorff & Ivers 2003; Ivers 2004). A tailored approach to tobacco control for Indigenous people, developed in consultation with Indigenous health groups such as the National Aboriginal Community Controlled Health Organisation, is essential to improving the inequity in health outcomes between Indigenous and non-Indigenous Australians and for breaking the cycle of poverty, poor preventive health and disease.

**The policy context**

**Brief history of tobacco control policy in Australia**

Australia’s tobacco control record over the past three decades has been relatively good. However, governments were initially slow to respond to the evidence demonstrating the dangers of smoking, and evidence-based tobacco control measures continue to be subject to delays and insufficient funding across jurisdictions, despite historical evidence showing the benefits of a strategic approach to reducing smoking rates.

Health authorities in Australia first called for formal government action to reduce tobacco use in the early 1960s, following international research that demonstrated the serious health risks associated with smoking. In 1962, health promotion organisations endorsed a report recommending restrictions on tobacco advertising and the introduction of a public health education campaign. While it took a decade for government to respond to calls for tobacco control measures, male smoking rates fell as the news media informed the public of the dangers of smoking.

The first significant government action, in 1972, was mandatory placement of health warnings on cigarette packages. From 1973 to 1976, broadcast advertising of cigarettes was phased out. These two national measures coincided with a major decline in smoking rates, a trend that has continued, in step with other measures aimed at reducing tobacco use.

In the 1980s, establishment of preventive health care as a public policy issue, evidence that smoking was the largest cause of preventable death and disease, and a shift in community attitudes to smoking, encouraged governments to do more to reduce the tobacco burden. Passive smoking became a prominent issue in the 1980s because of research demonstrating the dangers of exposure. The Australian Government legislated to eliminate smoking from federal workplaces in 1986 and from domestic aircraft in 1987.
State and territory governments, with varying levels of commitment and delay, have subsequently introduced restrictions on smoking in public places that are subject to jurisdictional legislation, such as public transport, taxis, and enclosed public places (e.g. shopping centres, restaurants and theatres and, in some states, pubs and bars). The Australian Government also banned tobacco advertising in the print media in 1989. In 1992, federal parliament passed the Tobacco Advertising Prohibition Act, phasing out most remaining forms of tobacco advertising by 1995.

Other key tobacco control measures have been excises on tobacco products (deterring purchase and providing revenue towards the tobacco disease burden) and social marketing campaigns aimed at raising public awareness of the dangers of smoking.

A milestone social marketing initiative was the Australian Government’s National Tobacco Campaign run in 1997 and 1998. A government-commissioned independent evaluation of the campaign found that investment in the first six months of the campaign alone returned more than double in savings via reduced healthcare costs and life-years saved. Despite this success, and recommendations from the evaluation team to re-run the campaign, there has been no coordinated national social marketing campaign aimed at reducing smoking rates on this scale since then. Because of its success, the campaign has been adapted for use in other countries.

Figure 1.2 Adult per capita consumption of tobacco products in Australia

Source: Compiled by Michelle Scollo, VicHealth Centre for Tobacco Control
**Australian National Tobacco Strategy 2004–2009**

Current national and inter-jurisdictional tobacco control policy is articulated in the Australian National Tobacco Strategy 2004–2009. The strategy sets out the intentions of federal, state and territory governments to work together and collaborate with non-government agencies on a long-term, comprehensive, evidence-based and coordinated national plan ‘to significantly improve health and to reduce the social costs caused by, and the inequity exacerbated by, tobacco in all its forms’ (MCDS 2004).

The Cancer Council endorses the objectives of the National Tobacco Strategy, which are, across all social groups:

- to prevent uptake of smoking
- to encourage and assist as many smokers as possible to quit as soon as possible
- to eliminate harmful exposure to tobacco smoke among non-smokers
- where feasible, to reduce harm associated with continuing use of and dependence on tobacco and nicotine.

The National Tobacco Strategy identifies the following areas for action:

- regulation of tobacco
  - promotion
  - place of sale
  - price (through tobacco tax)
  - place of use
  - packaging
  - products
- promotion of Quit and Smokefree messages
- cessation services and treatment
- community support and education
  - informing the community
  - preventing smoking uptake by children
- addressing social and cultural determinants of health
- tailoring initiatives for disadvantaged groups
- research, evaluation, monitoring and surveillance
- workforce development.

**Regulation of tobacco promotion**

Comprehensive bans on cigarette advertising and promotion were shown to reduce consumption, but more limited partial bans were found have little or no effect in data from 1970 to 1992 from 22 high-income countries (Jha & Chaloupka 1999). Econometric studies in high-income countries suggest that comprehensive bans on promotion reduce demand for tobacco by around 7% (CDCP 1999). When governments ban tobacco advertising in one medium, the tobacco industry will substitute advertising in other media with little or no effect on overall marketing expenditure (Jha & Chaloupka 1999). In Australia, tobacco promotion still occurs at point of sale and on packaging. Research suggests that such advertising increases positive feelings about cigarette brands (MCDS 2004).
Regulation of place of sale

Regulation of the supply of tobacco products should ensure that they are available to adults, but are not highly visible and are not sold to children. Laws banning sales to minors are more effective if the penalties are substantial and the laws are vigorously enforced so that the probability and cost of being caught outweighs the benefit of continuing illegal sales (MCDS 2004). Reductions in cigarette consumption by young people, however, have not always followed increasing sales restrictions. In Australia, the proportion of 12–17-year-olds who report buying their own cigarettes has declined since 1996, but there has been a corresponding increase in reports of obtaining cigarettes by having someone else buy them (White & Hayman 2004).

Regulation of price through tobacco tax

‘Real’ price increases (where increases are not matched by greater earning capacity, and affordability decreases) can depress demand for cigarettes (Jha & Chaloupka 1999). Higher prices (usually resulting from taxation increases) induce some smokers to quit, prevent other people from starting (CDCP 2000), reduce the number of ex-smokers who relapse, and reduce consumption among continuing smokers. A price rise of 10% on a pack of cigarettes would be expected to reduce demand by about 4%, but efforts to set an ‘economically optimal’ tax level have produced a wide range of estimates (Jha & Chaloupka 1999). However, effective taxation policy must ensure that increases are real, well publicised, and occur as often as necessary to maintain effective price rises. It is important that taxation effects are not insulated or absorbed by economies in manufacturing or tobacco companies’ pricing policies (Winstanley, Woodward & Walker 1995).

Increasing the price of tobacco products will decrease consumption more in low than in high-income groups. However, tax increases can cause financial stress for people on low incomes who continue to smoke. Support for price increases will be more likely if there is increased investment in supporting people on low incomes to quit (MCDS 2004).

Regulation of place of use

Restrictions on smoking in public places and workplaces will obviously benefit non-smokers. Importantly, smokers in workplaces with total bans on smoking are also likely to reduce the amount they smoke and increase their chances of successfully quitting (Fichtenberg & Glantz 2002). There is a high level of public support for restricting smoking in public places in Australia (AIHW 2005).

Regulation of packaging

Tobacco product packaging allows information on the product to be communicated to consumers. Since March 2006 cigarette packages in Australia have been required to carry colour graphic and text warnings on 30% of the front of the pack and 90% of the back of the pack. Information on a national Quit website and Quitline number appears on the back of the pack (DHA 2006). Tobacco products in Australia will no longer carry information about ‘yield’ of components (e.g. nicotine and tar) following concerns that consumers did not understand this information and acknowledgment that the labelling systems were based on flawed testing (MCDS 2004). Use of descriptors such as ‘light’ and ‘mild’ has also ceased after the Australian Competition and Consumer Commission found that the claimed relative health benefits of low yield cigarettes were misleading and likely to breach the Trade Practices Act (ACCC 2005). However, there is still potential for smokers to be misled, with continued use of colours and descriptors implying comparative health benefits, and the mechanism by which deception occurs has not been addressed (King & Borland 2005).
**Regulation of products**

Possible regulations could be requirements for ‘fire safe’ or reduced ignition propensity cigarettes (which automatically extinguish when they are not being smoked), and measures to reduce the addictiveness and palatability of products. A policy is needed ‘to coordinate regulation of tobacco products and products designed to replace tobacco, in ways that combine to reduce overall population harm’ (MCDS 2004).

**Promotion of Quit and Smokefree messages**

Long-term, high-intensity counter-advertising campaigns can reduce consumption when part of a multi-component program (Jamrozik 2004). Such campaigns also effectively reduce initiation of tobacco use, in combination with other interventions such as price increases and school and community programs (CDCP 2000). The National Tobacco Campaign initiated in 1997 (‘Every Cigarette Is Doing You Damage’) involved advertisements on television, on radio, in newspapers, and on bus billboards (CDHAC 2004). In a survey conducted to evaluate a 2004 campaign, 48% of smokers reported that the campaign messages provided encouragement to quit (CDHAC 2004).

**Cessation services and treatment**

Many people are able to overcome their dependence on tobacco and stop smoking, although people commonly have multiple attempts before succeeding (MCDS 2004). In Australia in 2004, 26% of people aged 14 and over described themselves as ex-smokers (AIHW 2005). The Cochrane Collaboration Methods have found the following interventions aimed at improving rates of quitting to be effective: brief advice from doctors; nicotine replacement therapy (via chewing gum, transdermal patch, nasal spray, inhaler, or tablet); the antidepressant drug bupropion (Zyban); tailored self-help materials; telephone counselling; and individual or group counselling (Cochrane Library 2006). However, pharmacotherapies are sometimes not used properly, reducing their efficacy, and clinical trial results are not always replicated when cessation aids are used in the real world.

Resources to encourage and assist doctors to provide cessation advice include the Guidelines for prevention activities in general practice (the ‘red book’) and the SNAP guide on smoking, nutrition, alcohol and physical activity as population health risk factors (RACGP 2005; RACGP 2004). A study on the application of SNAP in general practice noted that while verbal advice on smoking cessation advice is reported as being provided ‘very often’ by 68% of general practitioners, other studies indicate that only 0.6% of patient encounters involve cessation advice (Amoroso, Hobbs & Harris 2005).

The National Tobacco Strategy recommends an integrated strategy for cessation services that would enable coordination of policy and spending by programs covering public health, medical and pharmaceutical benefits, medical education, development of general practice and continuing education of virtually all health professionals (MCDS 2004).

**Informing the community**

Counter-advertising or negative messages about smoking from governments and health promotion organisations have been found to reduce consumption consistently according to studies from Australia, North America, Europe and Israel (CDHAC 1999). In general, the impact is greatest and most sustained when there is low general awareness of the health risks of smoking (Jha & Chaloupka 1999). In Australia, there is a high level of public knowledge of illnesses associated with passive smoking, although more could be done to update the community on new research (VCTC 2002a).
Preventing smoking uptake by children

A recent Australian review of youth tobacco prevention (DHA 2005) notes that prevention of tobacco uptake is a critical component of any comprehensive tobacco control strategy. Such efforts have largely focused on young people, given that smoking initiation is most likely to occur before 18 years of age. Theoretically, prevention or ‘early intervention’ initiatives represent a better long-term solution than cessation initiatives, given the addictive properties of nicotine. However, effective prevention strategies have remained largely elusive (DHA 2005).

High-profile campaigns to reset community norms about smoking and help adult role-models to quit can also greatly reduce smoking by children (MCDS 2004). Focusing efforts on adult smokers is supported by research that demonstrates that mortality can be better reduced by focusing on current smokers and near-term health problems (Levy, Cummings & Hyland 2000; Peto et al. 2000). Parental and sibling smoking is a well-established risk factor for smoking in adolescents (USDHW 1979). When parents who smoke quit before their children begin smoking, the risk of their children taking up smoking is significantly reduced (Farkas et al. 1999).

Adolescents (15–17 years) and people aged 18 to 39 years had similar responses to the Australian National Tobacco Campaign (White, Tan et al. 2003), suggesting that an adult approach is more effective with adolescents than a campaign specifically targeting them (Wakefield, Miller & Roberts 1999). Adolescents showed high campaign awareness regardless of smoking status, and many felt it was relevant to them, including almost 50% of non-smokers. In addition, 85% thought that the campaign made smoking seem less cool and around one-third felt it had discouraged some friends from taking up smoking (White, Tan et al. 2003).

There is little evidence that school-based programs are effective in the long term in preventing uptake of smoking. A review by the Cochrane Collaboration identified 23 high-quality randomised controlled trials of school-based programs to prevent children who had never smoked becoming smokers (Cochrane Library 2006). The interventions included information-giving, social influence approaches (representing the majority of studies), social skills training, and community interventions. There is little evidence that information alone is effective. Although half of the best quality studies in this group found short-term effects, the highest quality and longest trial (the Hutchinson Smoking Prevention Project) found no long-term effects from 65 lessons over eight years (Cochrane Library 2006).

Addressing social and cultural determinants of health

Investing in programs that strengthen community and cultural resources (e.g. programs to reduce the chance of educational failure, family conflict, loss of cultural identity and mental health problems) may well reduce uptake by young people of smoking (MCDS 2004). Such investment is crucial in Aboriginal and Torres Strait Islander and other very disadvantaged communities.

Tailoring initiatives for disadvantaged groups

Several social groups in Australia suffer a particularly high burden of tobacco-related death and disease (MCDS 2004):

- Australian Aboriginal and Torres Strait Islander peoples
- people suffering severe and disabling mental illness
- people who are institutionalised, including those in custodial settings
• parents/carers and children living in disadvantaged areas
• immigrants who left their home countries at a time when the dangers of smoking were not well understood.

**Australian Aboriginal and Torres Strait Islander peoples**

In 2004, 50% of Aboriginal and Torres Strait Islander people aged 18 years and over were current smokers, the same level reported in 1995. During the same period the prevalence of current smoking (daily, weekly and occasional) among all Australians fell from 27% to 21% (ABS 1994).

An audit by the Centre for Excellence in Indigenous Tobacco Control produced the following recommendations to improve and strengthen Indigenous tobacco control (Adams & Briggs 2005):

- Improve representation of Indigenous people on boards, advisory groups and in partnerships for tobacco control.
- Each state and territory should establish a process to ensure Indigenous tobacco control initiatives are sustainable and consistent.
- Tobacco control training for Aboriginal health workers should be supported through accredited training delivery.
- Professional development training in Indigenous tobacco control should be available.
- Organisations that fund tobacco control research should direct a proportion of their funding to Indigenous tobacco control research.
- Tobacco control research should include Indigenous people.
- Improve accountability of tobacco control organisations to provide services to Indigenous people.
- Develop an Indigenous tobacco control strategy.
- Provide a more consistent approach to tobacco control education for young Indigenous people in schools.
- Improve access to nicotine replacement therapies.

**Initiatives for other disadvantaged groups**

Projects targeting people with mental illness, people in custodial settings, people in disadvantaged areas, and people with limited English skills operate in some state and territory jurisdictions (MCDS 2004).

**Research, evaluation, monitoring and surveillance**

The National Drug Strategy Household Survey, which is conducted every three years, provides comparative data for adult smoking prevalence, but only limited data is currently available for Aboriginal and Torres Strait Islander peoples and particular cultural groups (AIHW 2005). Australia’s regular, standardised three-yearly surveys of student smoking are a valuable resource, providing reliable data about changes in children’s smoking behaviour since 1984 (White & Hayman 2004). Annual evaluation of the National Tobacco Campaign has provided data about smoking knowledge, attitudes and intentions, and Australia is also contributing to the International Tobacco Control Policy Evaluation Study to provide information on how tobacco control policies affect smoking cessation (MCDS 2004).
Workforce development

Recruitment and training
Given the focus on policy and regulation, the National Tobacco Strategy has identified a need to attract more people from legal, economic, public policy and scientific disciplines to crucial research and policy jobs. In addition, the importance of the public receiving accurate information about the health risks of smoking and the effectiveness of various treatments, policies and programs requires more people skilled in media relations.

Continuing education
As well as the behavioural aspects of smoking, people working in tobacco control need to better understand the toxicology and epidemiology of tobacco use and the social, economic and legal aspects of tobacco control. Training for health professionals must also be addressed as part of a comprehensive policy to treat tobacco dependence. To this end, the Australian National Training Authority has endorsed two units of competency in smoking cessation as part of the national population health training package.

Access to crucial information
Short term strategies endorsed in the National Tobacco Strategy are to:

- better synthesise information about developments internationally
- facilitate access to relevant research evidence
- facilitate sharing of ideas and resources between states and territories
- support biennial Australasian tobacco control conferences.

Framework Convention on Tobacco Control
In 2004 the Australian Government ratified the World Health Organization Framework Convention on Tobacco Control. The objective of the convention was to protect present and future generations from the health, social, environmental and economic consequences of smoking and exposure to tobacco smoke. Countries that ratify the convention undertake to implement a range of measures relating to tobacco price and tax increases; tobacco advertising and sponsorship; regulation of tobacco products; tobacco product disclosure; packaging and labelling; education, communication, training and public awareness; cessation measures; illicit trade; sales to minors; support for economically viable alternatives; liability issues; and scientific and technical cooperation and exchange of information (WHO 2004).

Tobacco Advertising Prohibition Act
The Tobacco Advertising Prohibition Act was passed in 1992 to, according to section 3 of the Act, ‘limit the exposure of the public to messages and images that may persuade them to start smoking, continue smoking, or use, or continue using, tobacco products’; and ‘to improve public health’. Evidence shows that the Act has worked effectively as a legislative instrument to limit the exposure of the Australian public to tobacco advertising through traditional mass media forms of marketing. However, a growing evidence base also shows that the Act has been ineffective in limiting exposure through other channels of communication, to which the tobacco industry has increasingly been turning since the Act was introduced.

In August 2003, the Australian Department of Health and Ageing published an issues paper as part of the Government’s review of the Tobacco Advertising Prohibition Act, inviting submissions to seek ‘community views on the relevance of the Act’. The Cancer Council
Australia in partnership with a number of other health promotion organisations, prepared a detailed submission documenting why the Act needed amendment to help eliminate the many ‘guerrilla’ and ‘under the radar’ marketing strategies used by the tobacco industry to sustain a lucrative market base in Australia. Evidence was presented, in the submission and at hearings, of strategies that circumvented and contradicted the objectives of the Act, such as event and venue promotions; point-of-sale marketing; direct marketing and the use of databases; premiums and value-added promotions; vending machines; internet marketing; international magazines; ‘buzz’ marketing; sporting and cultural events; and the promotion of smoking by broadcasters, publishers, film-makers, etc.

Despite the extent of this evidence, supported by separate submissions from health promotion bodies such as the Royal Australian College of General Practitioners, in April 2005 the Australian Government announced that the Tobacco Advertising Prohibition Act would not be amended, as the review found it to be working well in its current form and that any gains derived from amendment would be ‘insignificant’. The Cancer Council and its allies will continue to collect evidence on the tobacco industry’s exploitation of loopholes in the Act. While a general review of the Act is unlikely in the near future, opportunities may exist for one-off amendments.

**Trade Practices Act**

The *Trade Practices Act (Consumer Product Information Standard) 1974* is the legislative instrument under which graphic warnings on tobacco packaging were approved by federal parliament in 2004 and phased in from March 2006. Further amendments to the Act may facilitate the elimination of tobacco industry innovations such as slips to conceal graphic smoking warnings on tobacco products and ‘split packs’ enabling people with limited funds, such as children, to pool their money and break cigarette packets in half. In fact, prompt court action from the Australian Competition and Consumer Commission forced the withdrawal of ‘split packs’ less than three weeks after their appearance in October 2006. While this was an encouraging outcome, the introduction of the packs demonstrates the tobacco industry’s capacity to creatively exploit new markets, a capacity that evidence shows would be reduced through tighter packaging regulations under the *Trade Practices Act* and an updated and more rigorous *Tobacco Advertising Prohibition Act*.

**Tobacco control: a blue chip investment in public health**

Developed by the VicHealth Centre for Tobacco Control and The Cancer Council Victoria, *Tobacco control: a blue chip investment in public health* details a comprehensive framework for tobacco control investment based on analysis of the evidence. It makes recommendations for action by federal, state and territory governments and non-government organisations.

**Aims**

The Cancer Council endorses the objectives of the National Tobacco Strategy, which are to:

- prevent the uptake of smoking
- encourage and assist as many smokers as possible to quit as soon as possible
- eliminate harmful exposure to tobacco smoke among non-smokers
- where feasible, reduce the harm associated with continuing use of, and dependence on, tobacco and nicotine.
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<tr>
<th>What needs to be achieved</th>
<th>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</th>
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| Funding for tobacco control activities at a level that is commensurate with the scale of the harms caused, and sufficient to achieve specific declines in the prevalence of smoking | Encourage the Australian Government to set targets for smoking prevalence for Australian adults, children and among disadvantaged groups  
Encourage the Australian Government to allocate adequate funds for comprehensive tobacco control programs to achieve these targets  
Continue to develop proposals for funding sources and/or economic assessments to assist in obtaining the required level of tobacco control funding |
| Informing and reminding smokers about the harms of smoking, and motivating them to quit smoking | Advocate for the development and implementation of a well-funded and evaluated social marketing campaign  
Participate in national collaboration on the delivery of social marketing campaigns |
| Eliminating the promotion and marketing of tobacco | Urge the Australian, state and territory governments to eliminate loopholes in the current legislation and address the remaining avenues of promotion and marketing of tobacco, with a particular focus on:  
• images that portray smoking as desirable, in movies and other popular culture  
• vending machines and mobile retailing of tobacco  
• marketing through pack design  
• Internet advertising and sales display of tobacco products in retail settings  
• sale of devices designed to conceal health warnings  
Continue to identify, document and report any examples of promotion and marketing of tobacco and its effect on attitudes, knowledge and behaviour of smokers or those at risk of taking up smoking |
| Regulating tobacco products to protect the public interest | Urge the Australian, state and territory governments to regulate tobacco products to protect the public and smokers, by:  
• introducing stronger mechanisms to prevent false or misleading claims by the tobacco industry about its products  
• banning the use of additives in cigarettes that aid palatability and addictiveness  
• requiring that all cigarettes in Australia meet standards for reduced fire risk  
• banning filter venting as part of cigarette design  
• requiring that tobacco companies publish detailed information about the contents, emissions and design features of all tobacco products  
Encourage the Australian, state and territory governments to adopt licensing schemes to regulate the retailing of tobacco products  
Continue to identify, document and report problems that arise from the absence of regulation of tobacco products, and the harms caused to smokers as a result  
Together with public health groups, examine options and opportunities for improved regulation of tobacco products |
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| Further real increases in the price of tobacco products | Encourage the Australian Government to increase the excise on tobacco products at least in line with increases in average weekly earnings  
Encourage the Australian Government to ban the sale of duty-free cigarettes in Australia  
Encourage governments to step up measures to prevent evasion of excise and customs duty on tobacco |
| Strengthening existing accountability mechanisms to hold tobacco companies to account for the effects of their unlawful conduct | Publicly expose examples of the unlawful conduct of tobacco companies, and demonstrate the ongoing effects of that conduct  
Encourage litigation against tobacco companies where this is in the public interest  
Encourage the Australian, state and territory governments to provide resources and powers to bodies charged with enforcing accountability by the tobacco industry, including the Australian Competition and Consumer Commission and state/territory health authorities |
| Improvements in access to cessation support | Promote tobacco-dependence treatment as an integral component of cost-effective health care  
Work with governments and other parties to:  
• increase funding for Quit services, to meet need  
• implement subsidy and access arrangements for pharmacological assistance for those most in need  
• increase the incidence of primary health-care providers referring patients for cessation advice and assistance  
Facilitate the development and use of effective tailored and targeted support programs for high-risk groups, including Indigenous Australians |
| Protection of people from involuntary exposure to second-hand smoke and increasing the number of smoke-free public places | Urge state and territory governments to enact strong measures to create smoke-free environments with a particular focus on:  
• ensuring that legislation in relation to smoke-free pubs and clubs eliminates exposure to second-hand smoke  
• ending the exemptions to smoke-free legislation currently provided to high-roller rooms and other selected gambling venues  
• outdoor dining areas  
• addressing the need for cars carrying children and pregnant women to be smoke-free  
• health facilities and campuses  
Collaborate with the higher education sector and individual institutions to encourage smoke-free campuses  
Continue to conduct research to demonstrate the importance of smoke-free environments in protecting health, assisting smokers to quit, and changing public attitudes towards smoking |
### Tobacco

**What needs to be achieved**

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| Development of targeted tobacco control strategies for Indigenous Australians and others at high risk | Encourage and support the development of a national tailored tobacco control strategy for Indigenous Australians, in collaboration with the National Aboriginal Community Controlled Health Organisation and other Indigenous health groups.  
Encourage governments to provide adequate funding and other resources for the implementation of a tailored tobacco control strategy for Indigenous Australians.  
Continue to identify, document and report on tailored tobacco control interventions for disadvantaged groups. |
| Timely implementation of Australia’s obligations under the Framework Convention on Tobacco Control | Monitor, and report on, progress of implementation of Framework Convention on Tobacco Control measures in Australia.                                                                                       |
| Effective implementation and further development of the Framework Convention on Tobacco Control internationally and regionally | Support Framework Convention on Tobacco Control implementation in developing countries in the Western Pacific region.  
Encourage the Australian Government to play a leading role in the further development of the Framework Convention on Tobacco Control, including developing guidelines, protocols and compliance monitoring. |

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**Tobacco**


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Section One: Preventable risk factors


Melanoma incidence now exceeds lung cancer incidence. Skin cancer is, in financial terms, the most costly burden to the health system.

Introduction

The principal cancer related to excess ultraviolet (UV) radiation is skin cancer. Australia has the highest rates of skin cancer in the world. Skin cancer includes cutaneous melanoma and non-melanoma skin cancers (NMSC), namely basal cell carcinoma (BCC) and squamous cell carcinoma (SCC).

From as early as the 1950s and ‘60s, concern over high skin cancer rates led to limited community education campaigns programs in Victoria and Queensland. These aimed to raise public awareness about skin cancer and to increase health professionals’ early detection of skin cancer.

Since the 1980s, more extensive public health programs aimed at preventing excessive exposure to UV radiation have been implemented across Australia by cancer organisations and government health services. The ‘Slip! Slop! Slap!’ and SunSmart slogans, developed in 1980 and 1987 by The Cancer Council Victoria, have been the themes of many campaigns and are well recognised by Australians in relation to sun protection. The focus of these skin cancer prevention programs has been on reducing the potential harm of skin cancer by decreasing exposure to UV radiation and increasing early detection and effective treatment.

Despite the challenges of evaluating programs aimed at changing sun protection behaviour, evidence of the effectiveness and cost-efficiency of programs in Australia and overseas is accumulating. Research is increasingly linking public health programs that encourage behaviour change to reductions in incidence and mortality.

In addition to this, in Australia, there is evidence that primary prevention programs aimed at reducing sunlight exposure may be affecting skin cancer rates (Staples et al. 2006) and that changes in adult behaviour have resulted in some reduction in skin cancer incidence (Slevin, Clarkson & English 2000).

The link between ultraviolet radiation and cancer

The major causative factor in the development of melanoma and NMSC is UV radiation exposure (Sun Protection Programs Working Party 1996; Armstrong 2004). Childhood sun exposure is clearly important. In addition, adult exposure appears to contribute. The exact exposure needed to develop various skin cancers is not entirely clear. It is likely that both cumulative and episodic exposures are important, particularly if they cause sunburn.

Based on a review of recalled sun exposure by period of life in studies of melanoma, the relative risk of melanoma with a history of childhood sunburn is 1.8, while for sunburn in adulthood it is 1.5 (Whiteman, Whiteman & Green 2001).
In adult life, recreational (intermittent) sun exposure appears to be the strongest determinant of melanoma risk followed by total lifetime sun exposure and occupational exposure. Fair skin, which tends to burn easily and tan poorly, is also an important risk factor for skin cancer (Sun Protection Programs Working Party 1996; English et al. 1997; Armstrong 2004).

In relation to NMSC, there is evidence that childhood and recreational (that is intermittent and non-occupational) sun exposure is important in determining the risk of basal cell carcinoma, while cumulative sun exposure, latitude and occupational exposure are associated with squamous cell carcinoma (Sun Protection Programs Working Party 1996). The burden of disease depends on geographical location. Both BCC and SCC rates are around three times higher in latitudes closer to the equator (Staples, Marks & Giles 1998; NCCI 2003), where UV radiation is higher.

Impact of ozone depletion
Changes in the stratospheric ozone may also play a role in the incidence of skin cancer. The ozone layer acts as a barrier to UV radiation. Its depletion over the 20th century has resulted in higher incident radiation levels reaching the earth’s surface generally. The break-up of the Antarctic ozone layer has caused profound but localised ozone depletion over southern land masses (Armstrong 1996).

International measures to protect the ozone layer are showing signs of impact; despite this, climate change is expected to affect future ozone levels, slowing recovery of the ozone layer (Severi & English 2004). Due to the large variations in UV radiation levels during the day, it is difficult to accurately assess what impact ozone depletion has had on overall skin cancer incidence rates.

Solariums
Artificial UV radiation sources are also hazardous and for this reason solarium use should be avoided. Recent epidemiological studies have raised the possibility of an association between solarium use and melanoma (Young 2004; Gallagher, Spinelli & Lee 2005), however, epidemiological results generally lack consistency. Limited data from long-term follow-up of patients with severe psoriasis raise the possibility of an increase in SCC and BCC rates associated with solarium use (Autier 2004). There is no current evidence that supports the view that exposure to UV radiation through solariums is ‘safe’ or that tanning in this way protects against skin cancer.

Sunscreens
There has been some debate about the role of sunscreens in skin cancer prevention, and the potential association of sunscreen use with melanoma risk. A review (Gallagher, Lee & Bajdik 2004) found mounting evidence that sunscreen can prevent SCC, but no evidence that it can prevent BCC. It has been suggested that people may use sunscreen in order to stay longer in the sun and thus may increase their risk of cutaneous melanoma (IARC 2000). However, Gallagher et al. caution that retrospective case–control studies of melanoma and sunscreen use should be interpreted with great care, because of subject recall problems and confounding effects (2004).

Vitamin D
There is good evidence that vitamin D is obtained through sun exposure. There is also increasing evidence that vitamin D may protect against certain types of cancers (Garland et al. 1985; Garland et al. 1989; Giovannucci et al. 2006; Boniol, Armstrong & Dore 2006)
and can be beneficial in reducing the risk of osteoporosis. Therefore a balance is required between avoiding an increase in the risk of skin cancer and achieving enough UV radiation exposure to maintain adequate vitamin D levels.

For people with fair skin, it has been estimated that adequate vitamin D levels (>50 nmol/l) can be achieved in summer by exposing the face, arms and hands or an equivalent surface area for as little as 10 to 15 minutes, either side of the peak UV periods, on most days of the week (Samanek et al. 2006). In winter, in the southern states of Australia, where UV radiation levels are less intense, vitamin D levels may be maintained by approximately two to three hours of sunlight exposure accumulated over a week to the face, arms and hands or equivalent surface area. In northern states, the amount of sunlight exposure required to maintain adequate vitamin D levels is significantly less than this. Most people would achieve sufficient levels of sunlight exposure with normal outdoor activities without needing to deliberately seek additional sun exposure (TCCA 2006).

However, some people are at risk of vitamin D deficiency, for example, women with dark skin who wear veils (particularly in pregnancy) and elderly or disabled people in institutional care or who are housebound. These people may require dietary supplements (Marks et al. 1995; Nowson & Margerison 2002). In most situations, sun protection to prevent skin cancer is required during times when the UV Index is moderate or above (>3). At these levels, it is unlikely to put people at risk of vitamin D deficiency.

The impact

Skin cancer accounts for 81% of all new cases of cancer diagnosed in Australia each year (AIHW & AACR 2004).

Melanoma and NMSC account for almost 47% of the cancers managed by general practitioners (AIHW & AACR 2004).

Melanoma

Excluding NMSC, in 2005 melanoma was estimated to be the third most common cancer diagnosed in Australian women (after breast cancer and colorectal cancer, and the third most common in Australian men (after prostate and colorectal cancer). Overall melanoma incidence now exceeds that of lung cancer (AIHW & AACR 2004).

In Australia in 2005, 10,014 people were diagnosed with melanoma (5705 men and 4309 women) (AIHW, AACR, NCSG & McDermid 2005).

In Australia in 2005, there were 1273 deaths from melanoma (862 men and 411 women) (ABS 2007).

Trends in incidence and mortality

Melanoma is rare in populations of non-European origin (Severi & English 2004).

In Australia the lifetime risk (to age 75 years) of developing melanoma is 1 in 24 for men and 1 in 33 for women. In 2005 the mean age of first diagnosis for melanoma was 61 years for men and 57 for women. Between 1991 and 2005 the incidence rate for melanoma increased on average 1.5% per year among men and 0.9% per year among women (AIHW, AACR, NCSG & McDermid 2005).

Among younger age groups (< 25), the rate of new cases of melanoma (incidence) is stable (AIHW & AACR 2004). This is most probably due to a change in sun protection
behaviours as a result of public education programs, although it may in part be related to a change in the racial mix in the Australian population.

Mortality from melanoma rose steadily from 1931 to 1985 with annual rates of increase of 6% in men and 3% in women (Giles & Thursfield 2001).

Since 1990 the rate of death from melanoma in Australia has been relatively stable but remains twice as high for men compared to women. Mortality rates for men increased 0.7% per year between 1991 and 2005 and mortality rates for women decreased by 0.4% per year between 1991 and 2005 (AIHW, AACR, NCSG & McDermid 2005; ABS 2007).

**Non-melanoma skin cancer (NMSC)**

NMSC is the most common cancer in Australia (AIHW & AACR 2004).

Cases of NMSC are not reported routinely to cancer registries but data obtained from population surveys suggests that 374,000 Australians (equivalent to 1.8% of the population) are treated for NMSC each year (AIHW & AACR 2004; Staples et al. 2006).

It has been estimated that in 2002 in Australia, 256,000 people were diagnosed with BCC and 118,000 people were diagnosed with SCC (NCCI 2003).

In Australia in 2002, there were 407 deaths from NMSC (270 men and 137 females) (ABS 2004).

**Trends in incidence and mortality**

In 2002 the cumulative risks of developing at least one NMSC to age 70 years were 70% for men and 58% for women. Incidence rates of NMSC have increased from 1985 to 2002. The increase has been greatest for people 60 years and older while rates for people under 60 have stabilised (Staples et al. 2006).

The rate of treatment (and therefore diagnosis) of new cases of SCC rose by 133% between 1985 and 2002 and was similar across the sexes. The rate of treatment (and therefore diagnosis) of new cases of BCC rose by 35% between 1985 and 2002 and was greater in men (42%) than in women (26%). NMSC rates for both SCC and BCC were higher in more northerly parts of Australia (NCCI 2003).

Mortality from NMSC decreased overall between 1950 and 1994 but an increase in deaths among men was noted from the mid-1980s to the mid-1990s, a phenomenon thought to be related to the HIV/AIDS epidemic (Giles & Thursfield 2001). Mortality rates (2002) are now 1.6 per 100,000 for men and 0.5 per 100,000 for women (ABS 2004).

NMSC is Australia’s most expensive cancer. More than $264 million (9% of the total costs of cancer) was spent on diagnosis and treatment in 2000–01 (Staples et al. 2006).

**The challenge**

**Growth in the solarium industry**

One of our great challenges is to counter the growing influence of solariums as agencies that promote the desirability of a tan and potentially expose users to dangerous UV radiation. The number of solariums and their commercial profile have increased significantly over the last few years and competition in the industry has led to substantial publicity and marketing campaigns being waged by solarium operators. Solariums
have been assertively marketed to the young as a health and beauty aid. The number of establishments in one city alone (Melbourne) increased by more than 650% over five years to the end of 2001 (Fox 2001). We need to continue to educate the public on the dangers of solariums and dispel the many solarium myths.

**Advocating for solarium regulation**

Regulation of the solarium industry also remains a challenge. In the face of a degree of apparent reluctance by all state and territory governments, and also the Australian Government, to regulate the solarium industry, there needs to be persistent efforts to maintain and increase industry standards.

A study of 30 solarium centres in Melbourne during the 2003–04 summer demonstrated poor compliance by many operators with numerous aspects of the voluntary Australian Standard: 90% provided access to fair skinned customers and 52% of people aged 16 years were able to buy solarium services without the parental consent the code requires (Dobbinson, Wakefield & Sambell 2006).

**Increases in the desirability of a tan**

Despite improving attitudes towards sun protection, there is worrying evidence that attitudes to tanning and sun protection behaviours are again changing. There are indications of a recent increase in the desirability of a tan. This is thought to have been influenced by the growth in the number and profile of commercial solariums and fashions that have emphasised skimpy clothing with maximum skin exposure. The absence of a substantial paid mass media campaign around skin cancer may also have played a role. Given the association between sun protection advertising and people’s attitudes and behaviours, there needs to be more investment in mass media campaigns to reverse these trends before they affect skin cancer incidence and mortality.

**Explaining the risks and benefits of UV radiation exposure**

New debates continue to emerge in relation to the health risks and benefits of UV radiation exposure in terms of vitamin D. Some of these debates have the potential to confuse Australians and contaminate the sun protection message. The SunSmart UV Alert is a useful tool that can help explain when people need to protect themselves from UV radiation and when protection is not essential. However, this initiative requires monitoring and further marketing to ensure that the public understands and responds appropriately.

**Upskilling GPs in the assessment, diagnosis and treatment of skin cancer**

We need to ensure that the knowledge and skills of GPs keeps pace with scientific developments in the detection and treatment of skin cancer. It is critical that GPs know how to respond when people ask for a skin cancer check in response to SunSmart messages that tell them to seek GP advice about any suspicious spot or lesion.

**Changing adolescents’ sun exposure patterns**

Adolescents generally adopt sun protection behaviours less frequently than adults and it is more challenging to achieve attitude and behaviour changes among teenagers (Arthey & Clarke 1995; Mermelstein & Riesenberg 1992; Dobbinson & Hill 2004). Adolescents spend more time in the sun than any other group. While they have been shown to have a high level of knowledge on the dangers of sun exposure, they engage in relatively few sun protection behaviours. We need effective interventions that address adolescents’ growing perception of sun-tanning as desirable.
Screening for melanoma

There is insufficient Australian research to support a population melanoma screening program (refer to the chapter on melanoma for more information).

Absence of a long-term coordinated national skin cancer control program

For the first time the Australian Government has committed funds to a national approach, with $5.5 million being allocated to a social marketing approach delivered over the summer of 2006–07. However, despite achievements of over 20 years, Australia still lacks a long-term national skin cancer program. Cooperation continues to grow between the state cancer councils, but there is also considerable inconsistency in the funding available across states and territories to implement population-based skin cancer control campaigns.

Effective interventions

After more than 20 years of work, Australia is recognised as having the most extensive, comprehensive and longest-lasting skin cancer prevention programs in the world. Many have been based on and modified by extensive research and evaluation (Montague, Borland & Sinclair 2001).

Skin cancer prevention programs delivered throughout Australia by the state and territory cancer councils have been formed through needs analysis and formative research that has guided the development of effective and appropriately targeted strategies.

The Cancer Council Australia has a strong commitment to research that facilitates the development of evidence-based practice. Several state and territory cancer councils fund epidemiological and behavioural research that provides valuable expertise towards the development and evaluation of skin cancer prevention and early detection programs.

In 2003, The Cancer Council Australia and its members initiated the inaugural national sun survey to determine attitudes, knowledge and behaviours of the community with a specific focus on sun protection behaviours and sunburn incidence of Australian children, adolescents and adults (TCCA, unpublished data). The results of this survey provide valuable evidence to guide the development of skin cancer prevention strategies.

The health belief model (Egger, Spark & Donovan 2005) guides strategies that might influence people’s perceived risk, and ability to reduce this risk, within supportive environments, to motivate behavioural and attitudinal change. Once skin cancer prevention programs are implemented, evaluation determines the effectiveness of strategies and possible areas for improvement.

Site-specific interventions targeting settings such as childcare centres, pre-schools, primary and secondary schools, outdoor recreation settings, workplaces and health care settings have been shown to help reduce exposure to UV radiation (Glanz, Saraiya & Briss 2004). Of all settings, school programs have been shown to be most effective for improving knowledge and attitudes and in some cases improving short-term behaviours.

For skin cancer prevention programs to be most effective, they should adopt a multi-strategic approach that enables a variety of priority groups to be targeted. Glanz, Saraiya and Briss (2004) recommend that programs use individual-directed strategies, environmental, policy and structural interventions, media campaigns and community-wide multi-component interventions.
Buller and Borland (1999) concluded that comprehensive, community-wide programs can increase sun protection behaviours and reduce UV radiation exposure. These programs are more effective than smaller-scale interventions since they are delivered through multiple channels, creating repeated exposure to consistent sun protection messages. Overall, though more expensive, community-wide interventions may prove to be the most efficient and cost-effective way to achieve behaviour change.

In addition, skin cancer prevention programs should embrace the recommendations of the Ottawa Charter (WHO 1986) in relation to public policy development, advocacy strategies, developing personal skills, reorientating health services and strengthening community action.

The policy context

Skin cancer prevention can be aided by regulating the solarium industry, effective shade design by local government, and advocacy and policy for sun protection behaviours in the workplace. Strategies that increase GPs’ skills in early detection of skin cancer and encourage people to seek early diagnosis and treatment should also be supported.

Where possible, The Cancer Council Australia and its members seek to build strong partnerships with key stakeholders to support sound skin cancer prevention strategies. This collaborative approach allows the Cancer Council to access valuable advice and feedback from leading medical, policy and industry representatives, as well as consumers.

Aims

We encourage Australians to protect themselves throughout life against UV radiation, avoid unnecessary sun exposure and avoid exposure to other sources of UV radiation. Our aims are to:

- change the attitudes, knowledge and skills of individuals, particularly young people, about skin cancer and sun protection
- develop strategies for the early detection and effective diagnosis of skin cancer
- achieve healthy settings, organisations, products, policies and practices that promote sun protection
- strengthen the community’s capacity for coordinated action on skin cancer prevention
- inform the design, implementation and evaluation of skin cancer prevention strategies.

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<th>What needs to be achieved</th>
<th>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive changes in the attitudes of Australians towards sun protection with a particular emphasis on young people</td>
<td>Encourage the Australian Department of Health and Ageing to develop and implement a well-evaluated, long-term and comprehensive national social marketing campaign for children and young people aged 17 to 25 years</td>
</tr>
<tr>
<td>What needs to be achieved</td>
<td>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</td>
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</tr>
<tr>
<td>An increase in knowledge of the UV Index and application of the UV Index to sun protection behaviours</td>
<td>Ensure adequate public information dissemination of the UV Index through the media and other settings to reach population sub-groups involved in activities and situations identified at high risk for UV radiation exposure. Provide training and information to news agencies to support the widespread use of the UV Index.</td>
</tr>
<tr>
<td>An increased capacity to monitor behavioural trends</td>
<td>Every three years implement a national survey of sun protection along the lines of the Victorian Sun Survey, involving telephone interviews about sun-related experiences over the previous weekend, and details of temperature, cloud cover and UV radiation levels. Implement the Primary Schools and Early Childhood Survey nationally every three years.</td>
</tr>
<tr>
<td>An increased capacity to monitor epidemiological trends</td>
<td>Conduct a survey of incidence of non-melanoma skin cancer every five years: the next survey is due in 2007.</td>
</tr>
<tr>
<td>An increased capacity to know what works in relation to program delivery</td>
<td>Undertake specific research and evaluation studies to: • evaluate skin cancer control strategies • increase the likelihood of long-term Australian Government investment in skin cancer prevention • gather more evidence relating to the economic evaluation of skin cancer prevention • lead national and international understanding of what works in relation to skin cancer prevention.</td>
</tr>
<tr>
<td>Protection of young people in caring and educational settings</td>
<td>Provide support for the implementation of sun protection policies and practices by all childcare and pre-school centres across Australia in conjunction with local, state and territory and Commonwealth governments. Ensure state and territory governments adopt sun protection policies and practices in all Australian primary schools: in most states and territories this will involve continued development and extension of the National SunSmart Schools Program in all primary schools. Determine effective strategies and support their implementation to improve sun protection practices of students in secondary schools across Australia.</td>
</tr>
<tr>
<td>An increase in the amount of natural or constructed shade in public places</td>
<td>Encourage the adoption of shade provision and construction policies and building design standards by relevant areas of local, state and territory and Commonwealth governments.</td>
</tr>
<tr>
<td>Improved sun protection practices among outdoor workers</td>
<td>Encourage the inclusion of sun protection policies and practices in all relevant industrial agreements. Ensure the incorporation of specific provisions for sun protection practices into existing and future state and territory and Commonwealth occupational health and safety legislation.</td>
</tr>
<tr>
<td>An increase in the early identification of harmful skin lesions among older people, especially men over 50 years</td>
<td>Coordinate public relations activity and promotional material to educate people over 50 years about the importance of early detection.</td>
</tr>
</tbody>
</table>
What needs to be achieved | How The Cancer Council Australia and its members (the state and territory cancer councils) will do this
--- | ---
The safer operation and promotion of solariums | Encourage state and territory governments to implement and monitor legislation to control solarium operation and promotion
Monitor compliance by the solarium industry to the guidelines issued by the Australian Competition and Consumer Commission (ACCC) and the AS/NZS 2635:2002 standard for solaria, and draw any non-compliance with the *Trade Practices Act* to the ACCC’s attention
Increased knowledge of skin cancer prevention strategies among key professional groups | Encourage tertiary institutions to include information on sun exposure and sun protection in relevant education of childcare workers and teachers, medical practitioners, nurses and health professionals
Effective coordinated policy development and implementation | Develop and maintain evidence-based policy positions about the relationship between ultraviolet radiation and cancer to complement the Australian policy context
Ensure effective and coordinated policy development and implementation to ensure existing policies reflect the best available evidence
Increased knowledge and skills of medical practitioners in the early detection and treatment of melanoma | Encourage professional associations to increase GP skills in diagnosis of early skin cancer in order to avoid missed lesions and reduce unnecessary lesion removal through accredited training programs
Encourage state and Commonwealth governments to increase access for all Australians to diagnostic and treatment services, particularly Australians in rural and remote areas

References

**Ultraviolet radiation**


Section One: Preventable risk factors


**Nutrition**

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:

- 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)
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

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

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

**Dietary factor related to cancer risk**

<table>
<thead>
<tr>
<th>Dietary factor related to cancer risk</th>
<th>NHMRC recommended levels of consumption (NHMRC 2003 a &amp; b)</th>
<th>Trend in consumption</th>
<th>Proportion NOT meeting minimum levels of consumption in 1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary fat intake</td>
<td>Adults: total fat about 30% of total energy intake: maximum of 10% of total energy intake from saturated fat&lt;br&gt;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</td>
<td>Adults: significant decline (a positive trend) in mean intake of total fats 1983–95 (Cook, Rutishauser &amp; Seelig 2001)&lt;br&gt;Children: no significant change in total fat intake 1983–95 (Cook, Rutishauser &amp; Seelig 2001)</td>
<td>Adults &amp; children: mean total fat intake and saturated fat intake on day of survey slightly exceeded recommended levels (McLennan &amp; Podger 1998; Marks et al. 2001)</td>
</tr>
<tr>
<td>Salt intake</td>
<td>Maximum level of 2300 mg/day: this includes sodium in food as well as that added in cooking or consumption</td>
<td>No national trend data available</td>
<td>Adults: 1993 national data indicate mean sodium intake higher than recommended levels (Baghurst et al. 1996)&lt;br&gt;Children: no data available (NHMRC 2003b)</td>
</tr>
<tr>
<td>Sugar intake</td>
<td>&lt;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 &amp; FAO 2003)</td>
<td>No national trend data available</td>
<td>Adults: no data available&lt;br&gt;Children: Mean daily intake ranged from 7–15% of energy in girls and 8–14% of energy in boys (Somerset 2003)</td>
</tr>
</tbody>
</table>

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
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. Lifecycle 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.

<table>
<thead>
<tr>
<th>What needs to be achieved</th>
<th>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased awareness of the link between nutrition and cancer among the general public and key health professional groups</td>
<td>Monitor and clarify best evidence on the relationship between nutrition and cancer causation. Ensure key messages are promoted to the public and relevant health professionals in publications, presentations, programs, media statements and where opportunities arise. Promote and/or develop complementary primary health resources, specifically for general practice, to improve evidence-based interventions by health professionals.</td>
</tr>
<tr>
<td>Effective coordinated policy development and implementation</td>
<td>Develop and maintain evidence-based policy positions about the relationship between nutrition and cancer to complement the Australian policy context. Ensure effective and coordinated policy development and implementation.</td>
</tr>
<tr>
<td>What needs to be achieved</td>
<td>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| Social marketing campaigns that promote healthy eating                                    | Advocate for nationwide social marketing campaigns, that promote healthy eating across the life course, which are coordinated, sustainable and far reaching.  
Encourage the Australian, state and territory Governments to commit to long-term investment in promoting healthy eating.  
Support and deliver effective community interventions at a local and state level to address healthy eating.                                                                                                                                                                                                 |
| 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                                       | Support and conduct high-quality behavioural research further clarifying the barriers and enabling factors for people to adopt healthy eating.  
Work towards a better understanding of the determinants of the obesogenic environment, to inform policy development.  
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.                                                                                                                                 |
| More supportive environments that assist people to make healthy food choices               | Encourage the Australian Government to address the broader social and environmental determinants of poor nutrition, in particular:  
• 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  
Continue to support and promote the Parents Jury  
Participate on the Coalition on Food Advertising to Children  
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.                                                                                                                                 |
| An increased capacity to know what works in relation to program delivery                   | Undertake specific research and evaluation studies to:  
• 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.*
References

Nutrition


National Health and Medical Research Council (NHMRC) 2005. *Nutrient reference values for Australia and New Zealand, including recommended dietary intakes*. Canberra: Department of Health and Ageing.


National Heart Foundation (NHF) 2002. *Healthy eating for the heart. A guide to lowering your blood cholesterol*. Canberra: NHF.


Royal Australian College of General Practitioners (RACGP) 2006. *Putting prevention into practice: guidelines for the implementation of prevention in the general practice setting*. South Melbourne: RACGP.


Physical activity

Less than half of the Australian adult population achieves the current recommended levels of 150 minutes a week of moderate-intensity physical activity and less than one-third achieves the higher level of 60 minutes a day estimated to reduce colon cancer risk (Cerin et al. 2005).

Introduction

The study of physical inactivity as a risk factor for chronic disease commenced in the 1950s and focused on the epidemic of cardiovascular disease in Western countries. A pivotal review highlighted the public health benefits of regular physical activity (Pate et al. 1995). This was followed by the US Surgeon General’s report, Physical activity and health, which summarised the scientific evidence for the health benefits of physical activity (USDHHS 1996). More recently an Australian review has confirmed the dose–response relationship between physical activity and better health outcomes, specifically all-cause mortality, cardiovascular disease, stroke, some cancers, type 2 diabetes, depression and obesity (Bull, Bauman et al. 2004). In addition to the reduction in chronic disease risk, it is clear that physical activity provides age-specific benefits over a person’s life (Bull, Bauman et al. 2004).

Research on the link between levels of physical activity and specific cancers began during the 1980s but has increased rapidly over the last decade. Not surprisingly, the most commonly occurring cancers in men (prostate, lung, colorectal) and in women (breast, lung, colorectal) have been the subject of most published epidemiological studies. Recent reviews of physical activity and cancer have identified several hundred relevant studies (Friedenreich & Orenstein 2002; IARC Working Group 2002; Lee 2003; McTiernan 2003; Bull, Bauman et al. 2004; Gotay 2005). However, the majority of studies are observational rather than interventional (McTiernan 2003). More intervention studies are required to determine the optimal physical activity ‘dose’ for cancer prevention (McTiernan 2003).

The strongest evidence is for two of the most common cancers: breast cancer and colon cancer. It is also suggested that regular physical activity is associated with a reduction in all-cancer morbidity and mortality (Bull, Bauman et al. 2004); however this is likely to be due to the effect of exercise on breast and colon cancer. Whether physical activity reduces the risk of other cancers, including rectal, endometrial, prostate, testicular, kidney and lung cancer, remains less certain due to limited and inconclusive data (IARC Working Group 2002; Lee 2003). This remains an active area of research internationally.

Physical activity (along with nutrition) contributes to weight control by contributing to energy balance. Overweight and obesity have been associated with an increased risk of several cancers. It is clear that physical activity protects against cancer independently of its contribution to weight control. Overweight and obesity and physical inactivity are independent risk factors for cancer (Thune & Furberg 2001; Friedenreich & Orenstein 2002; IARC Working Group 2002; McTiernan et al. 2003).

More recently, physical activity and physical fitness have been shown to be beneficial to cancer patients. Despite being a relatively new area of research, physical activity before, during and after treatment is consistently showing a positive association with cancer outcomes (Courneya 2003).
How physical activity is measured

Understanding the ‘dose’ required

The epidemiological research investigating the contribution of physical inactivity to chronic disease, including cancers, is complicated by the complexities of physical activity assessment protocols in population-based research (Shephard 2003).

Physical activity is often classified by type. The type, or mode, of physical activity relates to the specific activity being performed (AIHW 2003). Broadly speaking, the three types of physical activity are aerobic, resistance and flexibility. Many activities cross more than one type, for example gymnastics has an aerobic, flexibility and resistance component (Whaley 2006).

Aerobic activities are assessed in terms of energy expenditure, which is a function of intensity, duration and frequency of activity. Intensity is a measure of how hard an activity is, duration is the time spent doing the activity and frequency is how many times, usually in a week, the activity is done (AIHW 2003).

In research, energy expenditure is often calculated in metabolic equivalents (METs). MET values are multiples of the resting metabolic rate (RMR), that is, 1 MET is the energy used when sitting quietly. One MET is equivalent to an oxygen uptake of 3.5 mL.kg-1.min-1 or to a caloric value of 1 kcal.kg-1.hr-1 (4.184 kilojoules per kilogram per hour) (Ainsworth et al. 2000).

Table 1.6 Examples of activities and MET intensities

<table>
<thead>
<tr>
<th>METs</th>
<th>Activity</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Inactivity, quiet</td>
<td>Sitting quietly and watching television</td>
</tr>
<tr>
<td>3.5</td>
<td>Walking</td>
<td>Walking for pleasure</td>
</tr>
<tr>
<td>8.0</td>
<td>Bicycling</td>
<td>Bicycling, 19–24 km/h, leisure, moderate</td>
</tr>
<tr>
<td>8.0</td>
<td>Water activities</td>
<td>Swimming, crawl, slow (50 m/min), moderate or light effort</td>
</tr>
<tr>
<td>12.5</td>
<td>Running</td>
<td>Running, 12 km/h (5 min/km)</td>
</tr>
</tbody>
</table>

Source: Ainsworth et al. 2000

More commonly the frequency, intensity and duration of physical activity are expressed separately, or frequency and duration are aggregated to give a total time (in minutes) per week. Activities are grouped according to intensity, for ease of use.

- **Vigorous-intensity** activity makes a person short of breath or ‘puff and pant’ (i.e. 7-9 METs).
- **Moderate-intensity** activity is when it is still possible to hold a conversation (i.e. 3-4 METs).
- **Walking** includes for recreation, transport or exercise. (Ainsworth et al. 2000)

Total activity time per week is used to assess whether an individual has completed sufficient physical activity for a health benefit (see next table). To account for the greater intensity, time spent in vigorous-intensity activity is weighted by a factor of two (that is, doubled) when calculating the total activity time per week.
Table 1.7 Definitions of sufficient and insufficient physical activity and sedentary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sufficient</td>
<td>The accumulation of at least 150 minutes of activity over one week in at least five sessions.</td>
</tr>
<tr>
<td>Insufficient</td>
<td>The accumulation of some activity but less than 150 minutes of activity per week.</td>
</tr>
<tr>
<td>Sedentary</td>
<td>No activity reported over the week.</td>
</tr>
</tbody>
</table>

Source: AIHW 2003

Recall of participation is a known difficulty in the assessment of physical activity. Vigorous intensity activity is generally reported better than moderate intensity activity (Slattery and Jacobs 1995). Misclassification of moderate intensity activities would decrease the ability to detect a real association (IARC Working Group 2002).

The link between physical activity and cancer

The role of physical activity in the prevention of specific cancers continues to be an active area of research and review (Lee 2003; McTiernan 2003; Roberts & Barnard 2005; Warburton, Nicol & Bredin 2006).

For the 2002 World Health Report, the World Health Organization systematically reviewed the evidence on breast and colon cancer (WHO 2002; Bull, Armstrong et al. 2004). In the same year, the International Agency for Research on Cancer (IARC) published its report, Weight control and physical activity, which included a comprehensive review of the epidemiological evidence relating to all cancers (IARC Working Group 2002). In 2003, The Cancer Council commissioned a review of the epidemiological literature linking physical activity and specific cancers (Bauman, Habibullah & Holford 2003), which is summarised in Getting Australia active II (Bull, Bauman et al. 2004). In the same year, Lee reviewed the epidemiological evidence for the major cancer sites: breast, colon, rectum, prostate and lung. Overall the findings are consistent: colon cancer and breast cancer risk decrease with increasing levels of physical activity (IARC Working Group 2002; Lee 2003; Slattery et al. 1997).

All the reviews have used similar criteria to assess the research design and population studied: number and characteristics of cancer cases; definition and measurement of physical activity; estimated time between physical activity exposure and cancer outcome; and estimated effect size, expressed as an adjusted odds ratio or relative risk (RR).

For colon cancer there is consensus that the risk reduction for physically active men and women is around 30% to 40% (RR 0.6–0.7), compared with inactive people (IARC Working Group 2002; Lee 2003; Slattery et al. 1997). By contrast, the evidence for rectal cancer is inconsistent, with most studies not able to detect a significant difference or reporting a weak association (Lee 2003; Slattery et al. 1997). There is a dose–response relationship between physical activity and colon cancer, with optimal protection proffered by 3.5 to 4 hours of vigorous physical activity or 7 to 35 hours of moderate physical activity each week (Slattery et al. 1997). There remains no clear agreement on the biological mechanism(s) for the protective effect (Westerlind 2003; Slattery et al. 1997). Current suggestions include a reduction in gastrointestinal transit time, improvements in immune function, hormone modulation (insulin, sex hormones and insulin-like growth factor), a reduction in free radicals and prostaglandin modulation (Westerlind 2003; Slattery et al. 1997).
There is consistent epidemiological agreement that physically active women have about a 20% to 30% reduction in breast cancer risk (RR 0.7–0.8) compared with inactive women (IARC Working Group 2002; Lee 2003). Unlike colon cancer, there is not specific detail on the optimal dose of physical activity for breast cancer, although it appears that 30 to 60 minutes per day of moderate to vigorous exercise is required to reduce risk. Again there is evidence of a dose–response relationship: breast cancer risk decreases with increasing levels of physical activity (Lee 2003). Risk reduction has been reported for both pre- and post-menopausal women. However it is still unclear which time period(s) in a woman’s lifespan are most important for physical activity in the development of breast cancer (IARC Working Group 2002). Like colon cancer, the biological mechanism(s) are not clear. Similar mechanisms have been postulated, with greater emphasis on oestrogen metabolism (IARC Working Group 2002; Lee 2003; Westerlind 2003).

There is no consistent evidence of an association between physical activity and other specific cancers. Endometrial, prostate, testicular, ovarian and lung cancers have been the subject of the most attention. Although some studies show an association between physical activity and lung cancer, it is possible that this relationship is confounded by smoking and/or other lung diseases (IARC Working Group 2002; Lee 2003).

Many questions remain unanswered in this comparatively new area of cancer research. It appears that more intense and more frequent and longer duration of activity may generally provide more protection (Bauman, Habibullah & Holford 2003). Further research is required into the dose–response relationship between physical activity and cancer and specific cancer sites; the type, frequency, intensity and duration of physical activity; and the biological mechanisms influencing cancer development (Lee 2003; UICC 2004; Gotay 2005; Roberts & Barnard 2005).

The impact

The population attributable risk (PAR) is often used to assess the relative public health importance of a risk factor. PAR is a function of the prevalence and strength of the association between the risk factor and the disease outcome. In the case of physical inactivity it represents the proportion of cases (for example colon cancer) that could be prevented if exposure to the risk factor were eliminated, that is, 100% of the population achieving sufficient physical activity (Bauman 1998; Stephenson et al. 2000). The PAR for physical inactivity has been estimated for two types of cancer, colon cancer and breast cancer, as the strongest epidemiological evidence relates to these cancers.

Table 1.8 Estimates of population attributable risk (PAR) for physical activity and cancer

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Breast cancer</th>
<th>Colon cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mezzetti et al.</td>
<td>1998</td>
<td>10.6%</td>
<td></td>
</tr>
<tr>
<td>Stephenson et al.*</td>
<td>2000</td>
<td>9%</td>
<td>19%</td>
</tr>
<tr>
<td>WHO</td>
<td>2002</td>
<td>10%</td>
<td>16%</td>
</tr>
<tr>
<td>IARC</td>
<td>2002</td>
<td>11%</td>
<td>13–14%</td>
</tr>
<tr>
<td>Slattery</td>
<td>2004</td>
<td>12–14%</td>
<td></td>
</tr>
</tbody>
</table>

* Estimate for the Australian population

Sources: Mezzetti et al. 1998; Stephenson et al. 2000; IARC Working Group 2002; WHO 2002; Smith 2004; Slattery 2004
Broadly speaking, there is agreement between the various estimates. It is likely however that these underestimate the true PAR. Variation in measurement and definition of physical activity between studies and the unaccounted-for contribution of physical inactivity to weight gain are all sources of potential error (IARC Working Group 2002).

In broad terms, therefore, it follows that increasing physical activity could prevent up to 1165 colon cancer and 1297 breast cancer cases annually (AIHW & AACR 2004).

The challenge

Australia has had three national physical activity surveys: in 1997, 1999 and 2000. The results from the three surveys (see figure below) are of concern, with a discernable downward trend in the proportion of the population reporting sufficient physical activity. In 2000, just over half of the adult population (56.8%) achieved the current recommended levels of 150 minutes per week while the proportion of Australians reporting no physical activity (sedentary) increased (13.4% in 1997 to 15.3% in 2000) (Bauman, Ford & Armstrong 2001).

Figure 1.3 Trends in proportion of Australian adults meeting recommended levels of physical activity

There has not been a national physical activity survey since 2000 so it is not possible to make an accurate assessment of the current population physical activity level in Australia. A number of states have conducted surveys during the intervening period based on the same instrument, the Active Australia questionnaire. Data from these state-based surveys show that the downward trend in physical activity has most likely continued.

The data from the 2000 national physical activity survey were re-analysed against three criteria for achieving sufficient physical activity (Cerin et al. 2005) (refer to figure 1.4 below):

- **National physical activity guidelines for adults**: accrual of ≥150 minutes of at least moderate-intensity activity through five or more sessions in the previous week (DHAC 1999).
• Moderate-intensity physical activity to reduce colon cancer risk: accrual of ≥420 minutes of at least moderate-intensity activity in the previous week (Slattery et al. 1997).

• Vigorous physical activity to reduce colon cancer risk: accrual of ≥210 minutes of vigorous activity in the previous week (Slattery et al. 1997).

Figure 1.4 Proportion of the population achieving three criteria for sufficient activity

The application of different criteria to the data from the 2000 national physical activity survey highlights that the prevalence of meeting physical activity criteria for colon cancer prevention is low and much lower than that related to the more generic physical activity recommendations. Less than half of the population (46%) achieves the recommended ≥150 minutes of at least moderate-intensity activity through five or more sessions in a week and only 26% meet the colon cancer criteria (Cerin et al. 2005). The same review also examined the socio-demographic factors associated with achievement of the physical activity criteria. Across each of the three criteria, physical activity is higher in males than females, decreases with age and increases with educational attainment (Cerin et al. 2005).

Effective interventions

There is potential to promote higher levels of participation in physical activity in the Australian population. Several recent reviews and reports have examined the evidence on effectiveness, key characteristics and best strategies for a population-based approach to promoting physical activity (Kahn et al. 2002; Bull, Bellew et al. 2004; NPHP 2005).

Be active Australia: a framework for health sector action for physical activity (NPHP 2005) is the current strategic framework for population-based physical activity promotion in Australia. The strategic focus of this framework contains three areas: settings, overarching strategies and population groups. The action areas are summarised below:

1. **Settings**
   - Community environments and organisations
   - Health services
• Childcare and out of school hours care
• Schools
• Workplaces

2. Overarching strategies
• Communication
• Workforce capacity
• Evidence, research, monitoring and evaluation
• Strategic management and coordination

3. Priority populations
• Aboriginal and Torres Strait Islander peoples
• Populations with special needs

*Be active Australia* is underpinned by *Getting Australia active II*, a major review of physical activity interventions across different settings and approaches and for different populations (Bull, Bauman et al. 2004).

Settings

*Community environments and organisations*

The influence of the environment on physical activity has been the subject of increased attention for the past decade. It is commonly accepted that the built environment provides opportunities (and barriers) to physical activity and can facilitate incidental physical activity. Unfortunately there is a paucity of evidence on the relative contribution of the environment to physical activity behaviour and there are limited data on the specific environmental attributes that increase physical activity (McCormack et al. 2004; Giles-Corti 2006). Environmental improvements require collaboration with and commitment from sectors outside of health, such as transport and urban planning. The health sector has a role in education, workforce development and advocacy, as well as contributing to the evidence base (Giles-Corti 2006).

*Health services*

Health services, particularly primary health care, are an important setting for individual physical activity interventions. There is little evidence on the effectiveness of population-based physical activity promotion in health services. Health professionals, in particular general practitioners (GPs) are an accessible, credible source of information for patients (RACGP 2004). Approximately 85% of Australians visit a GP in any given year (Britt et al. 2005).

Brief interventions for physical activity behaviour change, often based on the trans-theoretical or stages of change model, are recommended for use in general practice (RACGP 2005). Verbal advice, written materials (such as pamphlets and booklets) and exercise prescriptions can produce short-term increases in physical activity (Smith 2004). The nature and degree of change is not unexpected given the relatively brief counselling that patients receive. This could potentially be improved by involving other health professionals (for example, practice nurses), either in partnership with GPs or independently, to reinforce health messages and provide more follow-up with patients.
to help them achieve greater and more sustained behavioural changes to their habitual physical activity behaviours (Smith 2004; Brown 2006).

A number of electronic and paper-based resources are available to assist general practice to work with patients to improve physical activity, including:

- **SNAP**: A population health guide to behavioural risk factors in general practice (RACGP 2004)
- **Lifestyle prescriptions** (‘Lifescripts’) (DHA 2005)
- **Guidelines for preventive activities in general practice** (‘the red book’) (RACGP 2005)
- **Putting prevention into practice: guidelines for the implementation of prevention activities in the general practice setting** (‘the green book’) (RACGP 2006a)
- **National guide to a preventive health assessment in Aboriginal and Torres Strait Islander peoples** (NACCHO 2005).

**Childcare and out of school hours care**

There is very little published research on the effectiveness of physical activity interventions in the childcare setting (Timperio, Salmon & Ball 2004); however health promotion programs targeting childcare centres have proven to be very popular. The demand for SunSmart Centres and Start Right Eat Right (in Western Australia) suggests that childcare is a setting very receptive to health promotion interventions.

The majority of out-of-school-hours interventions published were conducted on primary-school-aged children in the US, either as after school, summer camp or family-based interventions. Programs that involved parents were the most effective. Out-of-school-hours care is a setting that offers considerable promise, but more evidence is needed in an Australian context and for adolescents (Timperio, Salmon & Ball 2004).

**Schools**

Schools are frequently identified as an important setting for health promotion. Successful school-based health promotion can simultaneously improve education and health (WHO 1997). School-based physical activity interventions can be classified into three types: curriculum-based strategies, environmental change strategies and policy-based strategies (Timperio, Salmon & Ball 2004). The most successful interventions incorporated a whole-of-school approach: that is, curriculum-, environmental- and policy-based strategies (CDCP 1999). Health promotion in schools requires cooperation and collaboration with the education sector, consistent with the health promoting schools framework (WHO 1997; NPHP 2005).

**Workplaces**

Workplace health promotion presents enormous potential to access large numbers of people at once and improve the health and productivity of the workforce. Up to now, however, there has been limited evidence supporting the effectiveness of workplace health promotion programs (Marshall 2004). Workplaces, like other physical and social environments, provide opportunities and barriers to physical activity. Non-specific programs and policies that promote incidental physical activity appear to be more successful and sustainable than individualised or targeted programs in the workplace (Marshall 2004).
Strategies

Communication

Communication and community education include mass media (social marketing), printed material, websites, telephone interventions and community education (Marshall, Owen & Bauman 2004; NPHP 2005). Overall, mass media successfully raise awareness of physical activity, measured through recall, but have modest effects on behaviour. Individual campaigns have reported more success in changing behaviour (Marshall, Owen & Bauman 2004). Interventions using print materials have shown some success in changing physical activity behaviour in the short term, whereas telephone- and Internet-based interventions have demonstrated limited success (Marshall, Owen & Bauman 2004).

Workforce capacity

Physical activity promotion is one priority among a range of conflicting and complementary prevention activities for health professionals (RACGP 2006a; RACGP 2006b). The capacity of the workforce is limited by the number of health professionals and the time available to them. All health professionals, not just GPs or those trained in exercise science, should play a role in increasing physical activity (Brown 2006). Opportunities exist to develop training packages, both informal and formal, for health (and other) professionals in primary prevention, specifically physical activity (NPHP 2005). Complementary resources (posters, pamphlets or brochures) and online support would add value and support for those who undertake training.

Evidence, research, monitoring and evaluation

There are no national data on the current level of physical activity for Australians. The most recent data were collected, and reported, in 2000. Since 2000, individual states and territories have undertaken a range of monitoring and surveillance activities, without national coordination. Better national coordination of the available data would allow a more accurate assessment of population physical activity trends over time and evaluation of the impact of national interventions.

Evidence continues to accumulate to support the protective role of physical activity in health. Despite this there are specific research areas with conflicting or insufficient data, including the role of physical activity in cancer prevention beyond breast cancer and colon cancer and the optimal amount and type of physical activity for weight loss and disease prevention.

It is clear that there is still a need for more well-designed research to evaluate which interventions work best, particularly those tailored to specific population groups and/or settings. The research identifies areas of promise and ‘best bets’, but considerable work remains to implement and test these approaches on a larger scale in the Australian context.

Strategic management and coordination

Successful action on physical activity requires strategic leadership and commitment at a national level as well as a coordinated approach at national, state, territory and local levels, with good communication between all stakeholders, including the non-government sector (NPHP 2005). The development of a national framework, Be active Australia, is the first step to underpinning good public health practice (Bull, Bellew et al. 2004). The absence of mandated accountability and adequate resourcing at a national level limits the opportunity for successful implementation of the framework (Bull, Bellew et al. 2004).
Populations

Aboriginal and Torres Strait Islander peoples

The review of interventions with Aboriginal and Torres Strait Islander peoples found very little published evaluation, despite an increase in the number and diversity of programs in these communities (Shilton & Brown 2004). There remains a need for much more effort in this area, in relation to measurement and interventions in urban as well as rural and remote communities (NACCHO 2005).

Populations with special needs

Populations with special needs are those Australians who face additional barriers to being physically active. It includes people with a chronic condition, including cancer (NPHP 2005). The number of cancer survivors (including people living with cancer) in Australia continues to increase. People who have survived cancer are at increased risk of many chronic diseases and may have to contend with disability associated with cancer treatment. Population-based physical activity strategies may not be suitable; rather, small group or individual interventions would be more appropriate for these groups (NPHP 2005).

The policy context

Policies, reports and strategic plans have been produced by most state and territory governments, providing direction for improvement in physical activity levels in Australia. The Cancer Council strongly supports the work of other chronic disease prevention agencies and institutions in the promotion of physical activity.

The National physical activity guidelines for Australians (DHAC 1999) includes these recommendations:

- Think of movement as an opportunity, not an inconvenience.
- Be active every day in as many ways as you can.
- Put together at least 30 minutes of moderate-intensity physical activity on most, preferably all, days.
- If you can, also enjoy some regular, vigorous exercise for extra health and fitness.

Australia’s physical activity recommendations for 5–12 year olds and Australia’s physical activity recommendations for 12–18 year olds (DHA 2004a; DHA 2004b) recommend that:

- Children need at least 60 minutes (and up to several hours) of moderate to vigorous physical activity every day.
- Children should not spend more than two hours a day using electronic media for entertainment (e.g. computer games, TV, Internet), particularly during daylight hours.

This is a recommended minimum level of activity for children, youth and adults. Higher levels are likely to give greater benefits.

Colon cancer and breast cancer risk reduces with increasing levels of physical activity. The optimal risk reduction for colon cancer is achieved at 3.5 to 4 hours of vigorous physical activity or 7 to 35 hours of moderate physical activity each week (Slattery et al. 1997). The American Cancer Society recommends that 45 to 60 minutes of moderate to vigorous activity on at least five days of the week is preferable (Kushi et al. 2006).
Aims

The Cancer Council Australia recognises the strength of evidence for physical activity in the prevention of breast and colon cancer and in the reduction of risk for other diseases, particularly cardiovascular disease and diabetes.

The body of evidence on health benefits of physical activity has led to general public health recommendations for adults to have 30 minutes of regular, moderate-intensity physical activity on most days of the week (DHAC 1999). To date, there is insufficient evidence to support the development of separate public health advice for the prevention of different illnesses, thus The Cancer Council endorses the recommendations that have been put forward in a consistent fashion by federal, state and territory bodies and other agencies.

The Cancer Council’s aims are to encourage the Australian population throughout life to:

- maintain at least a minimum level of physical activity: for adults at least 30 minutes of moderate-intensity activity on most days of the week, for children and adolescents at least 60 minutes
- participate in physical activity of longer duration and higher intensity, to further reduce colon cancer risk, where possible across the lifespan (consistent with the National physical activity guidelines for Australians)
- maintain a healthy body weight through a balance of food intake and physical activity.

<table>
<thead>
<tr>
<th>What needs to be achieved</th>
<th>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</th>
</tr>
</thead>
</table>
| Increased awareness of the link between physical inactivity and cancer among the general public and key health professionals | Monitor and clarify best evidence on the relationship between physical inactivity and cancer causation  
Ensure key messages are promoted to the public and relevant health professionals in publications, presentations, programs, media statements and where opportunities arise  
Promote and/or develop complementary primary health resources, specifically for general practice, to improve evidence-based interventions by health professionals |
| Effective coordinated policy development and implementation | Develop and maintain evidence-based policy positions about the relationship between physical inactivity and cancer to complement the Australian policy context  
Ensure effective and coordinated policy development and implementation |
| Social marketing campaigns that promote physical activity | Advocate for nationwide social marketing campaigns that promote physical activity across the life course which are coordinated, sustainable and far-reaching  
Encourage the Australian, state and territory governments to commit to long-term investment to increase the awareness of the health benefits of physical activity and promote increased participation  
Support and deliver effective community interventions at a local, state and national level to address physical inactivity |
<p>| An increased capacity to monitor epidemiological trends | Support and conduct high quality epidemiological research further clarifying the relationship between physical inactivity and cancer |</p>
<table>
<thead>
<tr>
<th>An increased capacity to monitor behavioural trends</th>
<th>Support and conduct high quality behavioural research further clarifying the barriers and enabling factors for participation in physical activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Work towards a better understanding of the determinants of the obesogenic environment, to inform policy development</td>
</tr>
<tr>
<td></td>
<td>Encourage the Australian Government to fund a comprehensive National Nutrition and Physical Activity Survey of children and adults, which is conducted, as a minimum on a regular five-year basis</td>
</tr>
<tr>
<td>More supportive environments that assist people to be more physically active</td>
<td>Encourage the Australian Government to address the broader social and environmental determinants of physical inactivity and sedentary lifestyles</td>
</tr>
<tr>
<td></td>
<td>Continue to support and promote the Parents Jury</td>
</tr>
<tr>
<td>An increased capacity to know what works in relation to program delivery</td>
<td>Undertake specific research and evaluation studies to:</td>
</tr>
<tr>
<td></td>
<td>• evaluate physical activity interventions</td>
</tr>
<tr>
<td></td>
<td>• gather more evidence relating to the economic evaluation of cancer prevention</td>
</tr>
<tr>
<td></td>
<td>• lead national understanding of what works in relation to cancer prevention</td>
</tr>
<tr>
<td></td>
<td>• identify barriers and enabling factors for implementation of these recommendations in general practice and other health settings</td>
</tr>
</tbody>
</table>

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

References

**Physical activity**


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Department of Health and Aged Care (DHAC) 1999. An active way to better health: national physical activity guidelines for adults. Canberra: DHAC.

——— 2004a. Australia’s physical activity recommendations for 5–12 year olds. Canberra: DHAC.


Section One: Preventable risk factors


National Aboriginal Community Controlled Health Organisation (NACCHO) 2005. *National guide to a preventive health assessment in Aboriginal and Torres Strait Islander peoples*. Melbourne: Royal Australian College of General Practitioners.


**Overweight and obesity**

*Obesity is associated with increased risk of cancer of the colon, breast (post-menopause), endometrium, kidney, oesophagus and gall bladder. Levels of overweight and obesity in Australia continue to be a major health concern. Of particular concern is the latest estimate that one in four children is overweight or obese.*

**Introduction**

Rising rates of overweight and obesity have been described as reaching epidemic proportions in the developed nations and causing concern in developing nations. Australia is no exception. Over the last 30 years, rates of overweight and obesity among adults and, even more worrying, among children, have risen and the rise is accelerating.

Overweight and obesity are a major public health issue: they are an established cause of morbidity and mortality and are one of the largest risk factors for chronic diseases in Western countries, particularly increasing the risk of diabetes, cardiovascular disease and some cancers (WHO & FAO 2003).

There are several ways to measure disease risk associated with overweight and obesity, including body mass index (BMI) and waist circumference.

BMI is the most commonly used and internationally accepted measure to assess overweight and obesity (NHMRC 2003a). This is calculated by dividing a person’s weight (in kilograms) by their height (in metres squared). According to the World Health Organization’s definitions, **adults:**

- with a BMI under 18.5 kg/m² are classified as **underweight**
- with a BMI of >18.5 to <25 kg/m² are classified as **healthy weight**
- with a BMI of >25 to <30 kg/m² are classified as **overweight**
- with a BMI of >30 kg/m² or higher are classified as **obese** (WHO & FAO 2003).

As BMI increases from a healthy weight to overweight or obesity, the risk of ill health rises. Individuals who are obese have a 50% to 100% increased chance of premature death from all causes compared to individuals with a BMI in the healthy range (WHO 2000).

It should be noted, however, that these classifications are not suitable for children and adolescents due to age-related growth patterns, and BMI-for-age percentile charts, developed by the Centers for Disease Control and Prevention, should be used to assess overweight and obesity in children. The National Health and Medical Research Council defines the following cut-offs for **children and adolescents:**

- BMI above the 85th percentile is indicative of overweight
- BMI above the 95th percentile is indicative of obesity (NHMRC 2003b).
The specific cut-off measurements of BMI may not be suitable for all ethnic groups, who may have equivalent levels of risk at a lower BMI (e.g. Asians) or higher BMI (e.g. Pacific Islanders or Polynesians).

Measurement of waist circumference may be a simpler valid alternative to BMI for health promotion (Han et al. 1996).

Waist circumference may also be a good predictor of cancer risk. The exact relationship between increased abdominal fat and increased cancer risk is currently unclear. Significant increased risk appears to occur when the waist circumference is greater than 102 cm for men and 88 cm for women (NHMRC 2003c).

Emerging epidemiological data highlight the importance of acting on obesity as a matter of considerable importance and urgency. The increasing trends to overweight and obesity among young Australians are particularly worrying. There is mounting evidence of links between childhood eating behaviour, physical activity trends and obesity, and of their association with long-term chronic conditions, including some cancers, diabetes and cardiovascular disease (Dietz 1998; Freedman et al. 1999; WHO 2000; Dunstan et al. 2000; Ebbeling, Pawlak & Ludwig 2002).

More children and adolescents are displaying the markers of adult chronic diseases, such as cardiovascular disease, type 2 diabetes and fatty liver disease (Booth et al. 2006).

Obesity essentially results from an imbalance between declining energy expenditure due to physical inactivity and high energy in the diet. High consumption of energy dense/nutrient poor foods (excess calories from high sugar or fat foods) is the main determinant of the obesity epidemic (WHO & FAO 2003).

These trends imply a pattern of rising health costs for governments as well as for individuals and the community in which they live (Booth et al. 2001).

The link between overweight and obesity and cancer

Obesity (BMI >30 kg/m2) is associated with increased risk of cancer at several sites; the evidence is clear for cancers of the colon, breast (post-menopause), endometrium, kidney, oesophagus and gall bladder (IARC Working Group 2002). Overweight (BMI of >25 to <30kg/m2) is similarly associated with these cancers, though the effect on risk is less (IARC Working Group 2002; WHO & FAO 2003; Boyle et al. 2003). Waist circumference greater than 102 cm for men and 88 cm for women, which is a marker of central obesity, might be a better predictor of cancer risk than BMI (MacInnis, English, Gertig et al. 2004; MacInnis, English, Hopper et al. 2004). Table 1.9 gives details of specific risk and the associations of these cancers with overweight and obesity.
### Table 1.9 Proportion of cancer attributable to overweight and obesity and associated factors

<table>
<thead>
<tr>
<th>Type of cancer</th>
<th>Proportion of incidence attributable to overweight or obesity</th>
<th>Aspects of the association between overweight or obesity and cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colon cancer</td>
<td>11%</td>
<td>Association seems greater in men than women</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Risk not dependent on whether person has been overweight in early adulthood or later in life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Some evidence that association in women may be increased by menopausal status and hormone replacement therapy (HRT) use in obese (Slattery et al. 2003)</td>
</tr>
<tr>
<td>Post-menopausal breast cancer</td>
<td>9%</td>
<td>Increase in risk of 30% in women with a BMI ≥28 kg/m² compared to those with a BMI of &lt;21 kg/m²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Factors that increase the association between obesity and breast cancer include family history of breast cancer and never having used HRT (IARC 2002)</td>
</tr>
<tr>
<td>Endometrial cancer</td>
<td>39%</td>
<td>Women with a BMI of &gt;25 kg/m² have a two- to three-fold increase in risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limited evidence suggests risk is similar in pre- and post-menopausal women</td>
</tr>
<tr>
<td>Kidney cancer</td>
<td>25%</td>
<td>Individuals with a BMI of ≥30 kg/m² have a two- to three-fold increase in risk compared to those below 25 kg/m²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The effect is similar in men and women</td>
</tr>
<tr>
<td>Oesophageal adenocarcinoma</td>
<td>37%</td>
<td>Strong association between being overweight and adenocarcinomas of the lower oesophagus and the gastric cardia, with a two-fold increase in risk in individuals with a BMI of &gt;25 kg/m²</td>
</tr>
<tr>
<td>Gall bladder cancer</td>
<td>24%</td>
<td>Limited evidence available but there is a suggestion of almost a two-fold risk, especially in women</td>
</tr>
</tbody>
</table>

Source: Bergstrom et al. 2001, based on figures from Europe

There is also emerging evidence that obesity is associated with increased risk of cancers of the pancreas and liver, and multiple myeloma and non-Hodgkin lymphoma (Calle et al. 2003).

It is interesting to note that overweight and obesity are risks factors for some of the most common cancers in Australia, such as colon and breast cancer. With the rising rates of obesity in Australia, there is concern that this will translate into an increased incidence of some of the less common cancers associated with obesity.

Up to now we have known that excess body weight increases cancer risk, but there has been a dearth of evidence to suggest whether losing weight would lower cancer risk. Recent evidence indicates that weight loss in those who are overweight lowers breast cancer risk (Eliassen et al. 2006).

Most of the evidence associating body weight with cancer is derived from case–control and cohort studies. However there has been one large scale randomised controlled trial, the Women’s Health Initiative, which randomised women to a very low fat diet intervention or a usual fat diet (Prentice et al. 2006). Unfortunately the Women’s Health Initiative was not designed to address weight loss, with the intervention group only losing...
0.4 kg more weight than the control group. While women on the low fat diet had a 9% lower incidence of breast cancer compared with the control group, 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).

As well as a healthy body weight being associated with preventing cancer, it is also associated with preventing cancer recurrence and improving survival for people diagnosed with cancer (Brown et al. 2003). There is a reasonable level of evidence that weight management and physical activity positively impacts on quality of life, cancer recurrence and overall survival for cancer survivors (Brown et al. 2003). Randomised controlled trials, such as the Women’s Intervention in Nutrition Study, have shown encouraging results of the effectiveness of nutrition and physical activity interventions in improving outcomes for cancer survivors (Chlebowski et al. 2005).

The impact

Obesity and its underlying factors of excess energy intake and physical inactivity contribute substantially to the overall Australian ‘burden of disease’, that is, the overall health problems based on mortality and disability.

For the first time in Australia, overweight and obesity has overtaken tobacco as the risk factor responsible for the most significant burden of disease: 8.6% compared with 7.8% for tobacco (AIHW 2006). Overweight and obesity accounted for 8.8% of the disease burden for males and 8.3% for females. Even though the burden from tobacco is only slightly lower than the burden from obesity, it is likely that the obesity burden will continue to increase, whereas the tobacco impact is declining due to the decreases in smoking prevalence over the last 40 years.

In Australia, 3% of all cancer deaths have been attributed to a BMI of >25 kg/m2 (Mathers, Vos & Stevenson 1999). More recent estimates from America suggest that overweight and obesity may account for 14% of cancer deaths in men and 20% in women (Calle et al. 2003).

US studies have suggested that the effects of obesity on quality of life and on health care costs are equivalent to 20 years of ageing (Sturm 2002), and that obesity is associated with at least as much morbidity as poverty, smoking or drinking (Sturm & Wells 2001).

Nationally, the direct costs of obesity represent a significant proportion of the health care budget and there is great potential savings from reducing the problem. International studies on the economic costs of excess body weight, including data from Australia, have shown that, conservatively, between 2% and 7% of total health care costs may be directly attributable to overweight and/or obesity (WHO 2002). In Australia in 2003 it was estimated to equate to about $1.2 billion per year (WHO 2002). Studies of indirect costs of work force participation have shown increased rates of long-term sick leave and premature disability leading to loss of productivity (WHO 2002).

A recent Australian report estimated that the total financial cost of obesity in 2005 was $3.7 billion (Access Economics 2006). The total health costs from cancer due to obesity
were $107.3 million in 2005, with 79% of the costs related to bowel and breast cancers. Given the social and psychological consequences of obesity, intangible costs such as impaired quality of life are significant, with estimates for obesity-related cancers at $218 million (Access Economics 2006).

Importantly, the escalating cost of health care of an obesity-related disorder, such as diabetes, has been calculated as almost doubling over time with normal progression of the disease (Bennett, Magnus & Gibson 2004). This suggests that the economic burden is not only significant, but is likely to get worse even if there is no further growth in the prevalence of obesity. Overseas studies have also found that those who are obese attain lower levels of occupational prestige and lower incomes than non-obese people (Bennett, Magnus & Gibson 2004). In addition, other studies have found that obese people as a group receive more sickness and unemployment benefits than people with a healthy body weight (Bennett, Magnus & Gibson 2004). Indirect costs, which are far greater than direct costs, include workdays lost, doctor visits, disability pensions and premature mortality, all of which increase as people go from a healthy weight to overweight or obesity (Wolf & Colditz 1996).

The challenge

In the 10-year period from 1985 to 1995, the level of combined overweight/obesity in Australian children more than doubled, while the level of obesity tripled in all age groups and for both sexes (Cameron et al. 2003).

Adults

There is a lack of recent national data on the levels of overweight and obesity in Australian adults, as the last National Nutrition Survey was conducted in 1995.

The Australian Diabetes, Obesity and Lifestyle Study in 1999–2000 found that the prevalence of overweight and obesity combined was almost 60% among Australian adults aged 25 years and over (Cameron et al. 2003). The rate for males was 67% and for females 52%. The prevalence of being overweight was 39%. For adult males it was 48% and for adult females 30%. The prevalence of obesity was 21% or more than double the rate observed 15 years earlier: 19% of adult males and 22% of adult females were obese.

According to the five-year follow-up of the Australian Diabetes, Obesity and Lifestyle Study, more than 600 adults progress from being overweight to being obese every day (i.e. more than 200,000 annually) (Barr et al. 2006).

The 1995 National Nutrition Survey found that the proportion of overweight and/or obesity increases with age for both males and females (Marks et al. 2001). Adult men seem to increase their weight rapidly between the ages of 25 and 40 years, while the weight of women changes most markedly during the menopausal years (45 to 55). Among people aged 19 to 24 years, one in three males and one in four females are overweight or obese. Among people aged 45 to 64 years, this rises to three out of four males and almost two out of three females.

Research has confirmed that weight increases are not just a result of ageing. Younger people are gaining weight faster than previous generations and weight gain is accelerating as modern life influences weight patterns. More people are entering adulthood weighing more. Data shows that those born later in the 20th century (Generation X) will gain weight as they age at a faster rate than their parents did (Allman-Farinelli et al. 2006a & 2006b). This is believed to be a result of the increasing obesogenic environment (see description later in this chapter).
The most recent data on the levels of overweight and obesity in Australian children comes from the 2004 NSW Schools Physical Activity and Nutrition Survey (SPANS), which surveyed 5500 children from 5 to 16 years of age (Bauman et al. 2003).

In 2004, almost a quarter of children and young people from kindergarten to Year 10 (aged five to 16 years) were overweight or obese (25% of boys and 23% of girls) (Bauman et al. 2003). Children aged nine to 12 had some of the highest rates (32% in Year 6 boys and 30% in Year 4 girls). Children from lower socio-economic areas and boys from Middle Eastern backgrounds were more likely to be overweight or obese (Bauman et al. 2003).

Overweight and obesity is far more common than it used to be. The proportion of school children who are overweight or obese has increased markedly over the past 20 years. It appears that in boys, the trend towards being overweight or obese is accelerating (Bauman et al. 2003). In girls the trend is not accelerating, but is still of concern (Bauman et al. 2003).

A study looking at weight changes among Australian children over three decades found that between 1985 and 1997, the combined prevalence of overweight and obesity doubled, and that of obesity trebled among young Australians. The increase over the previous 16 years was far smaller (Booth et al. 2001). In 1985 the prevalence of overweight and obesity in boys was 11% and 12% in girls, with 1.4% of boys and 1.2% of girls being obese. Only 10 years later, depending upon age, 14% to 26% of boys and 19% to 24% of girls were overweight or obese. The prevalence of obesity was 2% to 7% in boys and 4% to 6% in girls (Baur 2001; Magarey, Daniels & Boulton 2001).

Overall there was a statistically significant increase in children’s mean energy intake between 1983 and 1995. For boys, there was an increase of 1400 kJ per day; for girls, there was an increase of 900 kJ per day. These increases are much greater than those seen in adults (Cook, Rutishauser & Seelig 2001). The increase in energy intake was derived from an increase in foods high in refined sugars, such as soft drinks and confectionery (Cook, Rutishauser & Seelig 2001).
Obese children have a 25% to 50% chance of progression to adult obesity, and this may be as high as 78% in older obese adolescents (Must & Strauss 1999). This significant risk confirms the importance of preventive action.

**Specific population groups**

The problem of overweight and obesity is so large and widespread throughout the community that it is difficult to identify any particular group that is not profoundly affected by the problem. However, there are certain groups in the Australian community that bear a disproportionate burden of this condition.

Data suggest that among Aboriginal Australians and Torres Strait Islanders, overweight and obesity affect 60% of men and 58% of women (ABS 1995 National Health Survey results, cited in NHMRC 1997; NATSI Working Party 2001). The prevalence of obesity in males is 25% and in females 28%, compared with an overall population prevalence of obesity of 18%. Differences in the level of overweight and obesity between Aboriginal and non-Aboriginal men and women are most pronounced in the younger age groups. High levels of obesity are found even among the youngest age groups of Aboriginal men and women and they continue to increase throughout life, up to the sixth decade. However, the association between overweight and obesity and diseases such as diabetes, cardiovascular disease and cancers in these communities remains unclear (Guest et al. 1993; Leonard et al. 2002; Wang & Hoy 2002).

The level of overweight and obesity is higher (up to two to three times) among people of Southern European and Middle Eastern ethnic origin, when compared to those of British descent (NSW Health 2003). In contrast, those born in South East Asia had substantially lower levels of overweight, although care must be taken in interpreting these figures as the classification system may underestimate overweight in Asian people (Bennett & Magnus 1994; Bennett 1995; Mathers 1994; NSW Health 2003).

A low social status and low level of education are associated with a higher level of overweight and obesity, although the effect is more obvious in women and is not as strong as the relationship between social status and other illnesses (NSW Health 2003). Around 53% of women in the lowest socio-economic group were overweight, compared with 44% of women in the highest socio-economic group. In addition, 24% of women in the lowest socio-economic group were obese compared with only 14% of those in the highest group. There was no significant difference in the number of overweight or obese men in the highest when compared to the lowest socio-economic groups.

Some data suggest that rural and remote communities have higher levels of overweight and obesity (NSW Health 2003). The issue of access to appropriate foods and opportunities to engage in appropriate physical activity are likely to be major contributing factors to these differentials in rural and remote communities.

The clustering of factors such as low levels of education, low income and food insecurity, and their association with overweight and obesity levels, requires complex and sensitive interventions.
Effective interventions

Table 1.10 lists the key physical activity and eating behaviours that need to be increased or decreased to prevent overweight and obesity.

Most individual studies have been conducted in a very narrow range of settings and relied heavily on education approaches to small sections of the community. Very few studies have dealt with environmental, structural or policy change or were conducted on a truly community-wide basis (Campbell et al. 2005; Reilly et al. 2002; Ebbeling, Pawlak & Ludwig 2002; WHO & FAO 2003; Gill, King & Webb 2005; Summerbell et al. 2003).

Overall the literature states that for an intervention to be effective, initiatives should be long-lasting, multi-faceted and sustainable, and should target the whole environment and be behaviourally focused (Campbell et al. 2005; Reilly et al. 2002; Ebbeling, Pawlak & Ludwig 2002; WHO & FAO 2003; Gill, King & Webb 2005; Summerbell et al. 2003).

Some researchers have proposed a life-course approach to cancer prevention (Uauy & Solomons 2005). This should start before conception, be followed through childhood and continue through all stages of the life course, as described in the figure below. Mothers should start pregnancy with a healthy weight and avoid excessive or low weight gain during pregnancy. Infant and children’s growth should be regularly assessed to ensure children to do not gain weight excessively.

Figure 1.6 The life course approach to cancer prevention

Source: Uauy & Solomons 2005

There is general agreement that efforts should be heavily oriented towards prevention interventions in children because of the greater likelihood of success at a younger age. More effort needs to be directed at creating environmental and policy changes that will support the adoption of behaviours conducive to weight control, rather than simply relying on education approaches.
Table 1.10 Summary of the strengths of the evidence on factors that might protect or promote against weight gain and obesity

<table>
<thead>
<tr>
<th>Evidence</th>
<th>Decreases risk</th>
<th>Increases risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convincing</td>
<td>Regular physical activity</td>
<td>High intake of energy dense foods*</td>
</tr>
<tr>
<td></td>
<td>High dietary fibre intake</td>
<td>Sedentary lifestyles</td>
</tr>
<tr>
<td>Probable</td>
<td>Home and school environment that supports healthy food choices for children</td>
<td>Heavy marketing of energy-dense foods and fast food outlets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sugar-sweetened soft drinks and juices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adverse social and economic conditions in developed countries</td>
</tr>
<tr>
<td>Possible</td>
<td>Low glycaemic index foods</td>
<td>Large portion sizes</td>
</tr>
<tr>
<td></td>
<td>Breastfeeding</td>
<td>High proportion of food prepared outside of home</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rigid restraint/ periodic disinhibition of eating patterns</td>
</tr>
<tr>
<td>Insufficient</td>
<td>Increased eating frequency</td>
<td>Alcohol</td>
</tr>
</tbody>
</table>

* Energy dense foods are high in fat/sugar and energy.

Source: WHO & FAO 2003

Obesogenic environment

In the past, the usual environment throughout much of Australia enforced a reasonable degree of physical activity and limited food choice. Today there is access to a wide variety of cheap, energy dense/nutrient poor foods that are marketed powerfully and the population is encouraged, directly or indirectly, to avoid expending energy through physical activity. This has led researchers to describe the environment as ‘obesogenic’ in that it inhibits appropriate dietary and physical activity patterns and encourages energy imbalance (Gebel et al. 2005).

The next table summarises the best options to prevent weight gain based on a framework for a broad portfolio of actions for tackling weight gain prevention (Gill, King & Webb 2005). This framework considers the level of potential health gain and level of uncertainty of risk associated with different interventions, and adopts the concept of assessing the level of ‘promise’ to judge the worth of interventions.
Table 1.11 Best options to prevent weight gain

<table>
<thead>
<tr>
<th>Target setting</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best options for families</td>
<td>Reduce time spent watching TV and other sedentary behaviours</td>
</tr>
<tr>
<td>Best options for early childhood care</td>
<td>Improve parental knowledge and skills through early childhood care facilities</td>
</tr>
<tr>
<td></td>
<td>Enhance food service policies in early childhood care facilities</td>
</tr>
<tr>
<td></td>
<td>Enhance policies in early childcare facilities to promote physical activity</td>
</tr>
<tr>
<td>Best options for schools</td>
<td>Establish a network of health promoting schools:</td>
</tr>
<tr>
<td></td>
<td>• policy on food and drinks</td>
</tr>
<tr>
<td></td>
<td>• school physical environment</td>
</tr>
<tr>
<td></td>
<td>• physical activity opportunities</td>
</tr>
<tr>
<td></td>
<td>• health education curricula</td>
</tr>
<tr>
<td></td>
<td>• programs for out of school hours care</td>
</tr>
<tr>
<td>Best options for active</td>
<td>Active transport</td>
</tr>
<tr>
<td>neighbourhoods</td>
<td>Safe space for exercise facilities</td>
</tr>
<tr>
<td></td>
<td>Improve access to food options for families</td>
</tr>
<tr>
<td>Best options for workplaces</td>
<td>Increase options for incidental physical activity</td>
</tr>
<tr>
<td></td>
<td>Reduce passive work environments</td>
</tr>
<tr>
<td></td>
<td>Improve workplace food service options</td>
</tr>
<tr>
<td>Best options for primary care</td>
<td>Improve skills and knowledge of health workers</td>
</tr>
<tr>
<td>Best options for industry /</td>
<td>Work with local suppliers to reduce fat in common foods</td>
</tr>
<tr>
<td>food supply</td>
<td>Introduce taxation measures and subsidies to make healthy food options</td>
</tr>
<tr>
<td></td>
<td>cheaper</td>
</tr>
<tr>
<td></td>
<td>Develop a simplified food labelling system indicating energy and fat content</td>
</tr>
<tr>
<td>Best options for media /</td>
<td>Reduce exposure of children to food advertising</td>
</tr>
<tr>
<td>marketing</td>
<td>Implement social marketing strategies to support improvement of parents as</td>
</tr>
<tr>
<td></td>
<td>healthy role models</td>
</tr>
<tr>
<td>Best options for support</td>
<td>Improve monitoring of weight and fitness status</td>
</tr>
<tr>
<td>structures</td>
<td>Implement ‘whole of community’ demonstration projects</td>
</tr>
</tbody>
</table>

Source: Gill, King & Webb 2005

Individual behaviour change

What research there is has generally focused on individual behaviour change with little attention to organisational and environmental change. There is a lack of research on the efficacy of different approaches to high risk, hard-to-reach, low income, and culturally and linguistically diverse populations that appear to experience higher rates of overweight and obesity.

Some short-term intense programs are reported as being effective in terms of weight loss, but there are doubts about sustainability (Huon, Wardle & Szatto 1999; Gortmaker et al. 1999; Sahota et al. 2001). Researchers (Ebbeling, Pawlak & Ludwig 2002) suggest that these interventions have tended to focus on highly motivated families through specialist clinics, and that, on the whole, there is little evidence that treatment interventions are
more than moderately effective. The relatively small short-term weight losses are generally reversed in the long term.

**Schools and workplaces**

Most prevention interventions targeting children and adults have been implemented in schools and workplaces and have adopted health education and/or behaviour modification strategies. With a few exceptions, these have largely been shown to be ineffective.

School-based interventions to reduce soft drink intake among children have shown potential to be effective in preventing excess energy intake and overweight (James et al. 2004; Ebbeling et al. 2006). Other interventions that show the greatest potential for reducing obesity in children are those that reduce sedentary behaviours at home (particularly hours spent viewing TV), and promote physical activity—both in and out of school hours—as well as improved diet.

Many states in Australia have introduced policy guidelines for school canteens, to address the need for healthier choices to be available at schools.

Obesity prevention interventions that have tended to fail have been those that addressed either diet only or physical activity only, that relied primarily on education strategies without considering environmental influences, or that focused on activities and behaviours that only occur in limited settings, such as school hours (Ebbeling, Pawlak & Ludwig 2002; Reilly et al. 2002; Micucci, Thomas & Vohra 2002). One of the challenges in tackling childhood obesity is the difficulty in engaging and reaching parents. Schools can be a delivery site for interventions but must consider options to reach the whole family.

**Policy**

Although evidence is sparse on the effectiveness of environmental change interventions, particularly policy and regulatory interventions, they have been proposed as an essential strategy for combating the obesity epidemic.

There is limited evidence about the effectiveness of economic intervention, such as taxes, price policies and incentives, in containing or reducing food consumption, particularly energy dense foods (Goodman & Anise 2006). However, modelling analyses drawing upon actual market data to track how food purchasing responds to changes in prices suggest that a combination of increased prices (in the form of taxes) for such nutrients as fat, saturated fat and sugar and subsidies on high fibre foods could reduce the consumption of the taxed nutrients as well as total energy intake.

A small body of evidence indicates that reducing the price of fruit, vegetables and other healthy snacks at the point of purchase (vending machines, cafeterias and supermarkets) increase their consumption (Anderson et al. 2001; Buscher, Martin & Crocker 2001; French, Jeffery et al. 1997; French, Story et al. 1997; French et al. 2001; Jeffery et al. 1994; Kristal et al. 1997).

Although economic measures were an important strategy in tobacco control, there is a risk that economic policy interventions involving increases in food prices would negatively impact on low socio-economic groups. Therefore they would need to be carefully assessed before being implemented. Taxation of soft drinks has been proposed as a potential strategy, particularly because of the success of taxation of alcoholic drinks in lowering alcohol consumption. Reduction in intake of soft drinks is associated with obesity reduction (James et al. 2004; Ebbeling et al. 2006). Soft drinks are a single dietary item that generally provides little nutrition apart from sugar and energy.

More effective regulation around food marketing has been proposed as an important and cost-effective strategy for addressing childhood obesity (DHS 2006). Children require
special consideration with respect to advertising, as they are less able than adults to understand fully the intent of advertising or its persuasive techniques, and are thus less able to judge the advertisements critically. The excessive level of food advertising on Australian televisions contributes to an obesogenic environment (Chapman, Nicholas & Supramaniam 2006; Neville, Thomas & Bauman 2005). Systematic literature reviews indicate that food advertising contributes to poor food choices, poor overall diet and thus increased weight gain and obesity (CFMDCY 2005; Hastings et al. 2003).

All advertising during children’s programs is prohibited in Sweden (since 1991), Norway (since 1982) and Quebec Canada (since 1980) (Hawkes 2004). In all three cases, the ban is enforced by a government agency. Children in Quebec who are not exposed to television food advertising, have significantly less overweight and obesity than the Canadian average (Shields 2006). A study showed a significantly positive correlation between the number of television food advertisements and the incidence of children’s overweight across countries (Lobstein & Dibb 2005). Sweden had the lowest number of food advertisements in this study and the lowest prevalence of overweight, whereas Australia and the US did not fare so well (Lobstein & Dibb 2005). The high levels of unhealthy food advertising are also a concern because of the potential to limit the effectiveness of social marketing campaigns for healthy foods and lifestyles (Hoek & Gendall 2006).

**Broad-based public health interventions**

Prevention interventions that have adopted a population, community-wide or even neighbourhood approach, and encompass environmental, legislative and regulatory change as well as education and behaviour modification strategies, are largely absent and effectiveness cannot be assessed.

While we lack high-quality evidence on obesity interventions, there is growing knowledge about the efficacy of broad-based, comprehensive public health interventions in fields such as tobacco and skin cancer control, HIV/AIDS and road trauma reduction, increased immunisation rates, decreased coronary heart disease and increased physical activity (Hawe, Wise & Nutbeam 2001; DHA 2003; Bauman et al. 2002; Bauman et al. 2003; Gill, King & Webb 2005). The research suggests that effective public health interventions are sustained, research-based and multi-faceted, and tackle social, cultural, behavioural, organisational and environmental factors.

Evidence of population-based obesity interventions is weak (because of a modest impact) or absent (they have not been tried and evaluated). The World Health Organization states: ‘population education strategies will need a solid base of policy and environment-based changes to be effective in eventually reversing these trends’ (WHO & FAO 2003).

**General practice**

Although to date there has been insufficient research to provide an evidence base for the role of the general practitioner (GP) in obesity prevention, their role at the forefront of providing primary care in Australia is recognised as having ‘enormous potential to encourage patients to take greater responsibility for their health, which includes changing lifestyle’ (RACGP 2006).

Several initiatives over recent years have targeted GPs as a crucial point of intervention in obesity. In 2003 the National Health and Medical Research Council published two guidelines for GPs (Overweight and obesity in adults and Overweight and obesity in children and adolescents). The guidelines focus on the clinical management of overweight and obesity to be applied in the general practice consultation.

The Royal Australian College of General Practitioners has produced three significant publications. The first, Guidelines for preventive activities in general practice (the ‘red book’) (RACGP 2005) also focuses on the role of the GP within the consultation recommending
a screening approach particularly for children and adolescents. *SNAP: A population health guide to behavioural risk factors in general practice* (RACGP 2004) provides more extensive information and recommendations regarding overweight and obesity (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, *Putting prevention into practice: guidelines for the implementation of prevention in the general practice setting* (the ‘green book’) (RACGP 2006) assists in the development of systems within general practice to support prevention activities at the practice as well as the consultation level.

In further support of the GP’s role in 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**

In 2003, the National Obesity Taskforce, with representation from Commonwealth and state health jurisdictions, developed a four-year national action plan for tackling obesity, known as *Healthy weight 2008: the national action agenda for children and young people and their families* (NOTF 2003). The goals are to:

- achieve healthier weight in children and young people
- increase the proportion of children and young people participating in and maintaining healthy eating and adequate physical activity
- strengthen the knowledge, skills, responsibility and resources of all people and communities to achieve optimal weight
- address social and environmental determinants of poor nutrition and physical inactivity
- focus action on giving children, young people and families the best possible chance of maintaining a healthy weight.

A ministerial taskforce to coordinate an anti-obesity campaign was announced in July 2006. It includes government, industry and community representation from the areas of health, communications, education, and sport.

*Healthy weight 2008* was preceded by *Acting on Australia’s weight: a strategic plan for the prevention of overweight and obesity* (NHMRC 1997), *Eat well Australia: a strategic framework for public health nutrition*, (SIGNAL 2001), and the *National physical activity for health action plan* (NPHP 2005).

Many of the states and territories have developed frameworks and action plans similar to the Commonwealth initiative. The New South Wales and Victorian governments held child obesity summits in 2002 and Queensland held a summit in 2006 to focus attention and action on rising rates of overweight and obesity in young people.

Internationally, the World Health Organization has adopted a Global Strategy on Diet, Physical Activity and Health, which was endorsed by the May 2004 World Health Assembly (WHO 2004). The International Union Against Cancer has developed a policy to
address action on a range of cancer prevention issues including obesity, in Evidence-based cancer prevention: strategies for NGOs (UICC 2004).

Other relevant food policy contexts include the regulatory systems for food safety and food marketing. Food standards and regulation fall under the domain of the statutory authority, Food Standards Australia New Zealand. This has responsibility for setting standards for the production and sale of food in Australia, including food labelling issues such as nutrition and health claims.

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 include some regulations for limiting 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.

Existing recommendations
The Cancer Council Australia supports the National Health and Medical Research Council recommendations in relation to body weight and the maintenance of a balance between energy intake (healthy eating) and energy output (physical activity). For adults, the guideline states, ‘Prevent weight gain: be physically active and eat according to your energy needs’ (NHMRC 2003c). For children, the guideline does not refer specifically to body weight, but reads, ‘Children and adolescents need sufficient nutritious foods to grow and develop normally. Growth should be checked regularly for young children. Physical activity is important for all children and adolescents’ (NHMRC 2003b).

The Cancer Council recommends that adults maintain a healthy weight within a BMI range of 18.5–25 kg/m2. To achieve and maintain a healthy weight, The Cancer Council recommends regular physical activity and eating according to energy needs. Making fruit, vegetables, cereals and other low fat foods the basis of the diet may assist with achieving and maintaining healthy body weight.

Aims
Our aims are to encourage the Australian population to:

- maintain a healthy body weight throughout life by means of a balance of food intake and physical activity
- 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
- adopt a physically active lifestyle
- ensure children have a nutritionally adequate and varied diet and adopt an active lifestyle appropriate to different age groups.

We also aim to advocate for more supportive environments to make healthy choices easier choices.
<table>
<thead>
<tr>
<th>What needs to be achieved</th>
<th>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</th>
</tr>
</thead>
</table>
| Increased awareness of the link between obesity and cancer among the general public and key health professional groups | Monitor and clarify best evidence on the relationship between obesity and cancer causation  
Ensure key messages are promoted to the public and relevant health professionals in publications, presentations, programs, media statements and where opportunities arise  
Promote and/or develop complementary primary health resources, specifically for general practice, to improve evidence-based interventions by health professionals |
| Effective coordinated policy development and implementation                               | Develop and maintain evidence-based policy positions about the relationship between obesity and cancer to complement the Australian policy context  
Ensure effective and coordinated policy development and implementation |
| Social marketing campaigns that promote healthy weight                                  | Advocate for nationwide social marketing campaigns that promote a healthy body weight across the life course, which are coordinated, sustainable and far reaching  
Encourage the Australian Government to commit to long-term investment in promoting a healthy weight  
Support and deliver effective community interventions at a local and state level to address healthy weight |
| A reduction in rising rates of obesity in both children and adults                       | Contribute to national developments on reducing obesity in Australia through collaboration and partnerships with major agencies  
Recognise the significant public health gains to be made in reducing rates of obesity in childhood |
| An increased capacity to monitor epidemiological trends                                 | Support and conduct high-quality epidemiological research further clarifying the relationship between obesity and cancer |
| An increased capacity to monitor behavioural trends                                     | Support and conduct high-quality behavioural research further clarifying the barriers and enabling factors for people to adopt healthy eating and physical activity behaviours  
Work towards a better understanding of the determinants of the obesogenic environment, to inform policy development  
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 |
What needs to be achieved | How The Cancer Council Australia and its members (the state and territory cancer councils) will do this
--- | ---
More supportive environments that assist people to make healthy food choices and provide opportunities to be physically active | Encourage the Australian Government to address the broader social and environmental determinants of poor nutrition and sedentary lifestyles, in particular:
- 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
- improve physical environments to increase opportunities for physical activity
Continue to support and promote the Parents Jury
Participate on the Coalition on Food Advertising to Children
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

An increased capacity to know what works in relation to program delivery | Undertake specific research and evaluation studies to:
- evaluate healthy weight 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 nutrition chapters when considering promotion of healthy weight.
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Section One: Preventable risk factors


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Section One: Preventable risk factors


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Alcohol

Alcohol is a known risk factor for cancer. There is no evidence to suggest that alcohol may be protective for any form of cancer.

Introduction

Alcoholic beverages have both nutritive and psychoactive properties. The history of alcohol use by humans can be traced back over thousands of years, where it has played an important role in the culture of a diverse range of communities throughout the world. Heavy drinking has been associated with Australian culture since the early days of European settlement (Room 1988).

The National Health and Medical Research Council has established Alcohol guidelines for Australians based on a standard drink (i.e. 10 grams of ethanol). In order to avoid alcohol-related harms in the short term, the guidelines recommend no more than six standard drinks for males and no more than four standard drinks for females during any single drinking occasion (NHMRC 2001). For individuals drinking more than this, the risk of injury or death due to short-term harms (e.g. road injury, violent assault, drowning, falls, alcoholic poisoning) increases significantly. Consumption in excess of these levels is categorised as either ‘risky’ or ‘high-risk’ depending on the amount drunk.

In relation to long-term harms that can arise from ongoing excessive levels of consumption (e.g. alcoholic liver cirrhosis, a range of cancers, heart disease and stroke, dependence and psychosis) the National Health and Medical Research Council recommends that males drink no more than 28 standard drinks over a week and females no more than 14 standard drinks (NHMRC 2001). Drinkers who consume more than this are at risk of experiencing ‘chronic’ alcohol-related disease and disability. Since chronic alcohol-related illness tends to develop over a lifetime of drinking, they occur most frequently among people over 45 years of age (NHMRC 2001).

The National Health and Medical Research Council alcohol guidelines reflect the fact that women are more susceptible to adverse effects of alcohol because they typically have a smaller body size and metabolise alcohol differently (NHMRC 2001).

Information on the health burden attributable to alcohol in Australia largely comes from an examination of research into its health effects and estimation of the proportion of diseases (including cancer) attributable to alcohol e.g. (English et al. 1995; Riddolofo & Stevenson 2001; Chikritzhs et al. 2003).

The link between alcohol and cancer

Alcohol is a known risk factor for cancer. In 1988 the International Agency for Research on Cancer classed alcohol as a Group 1 carcinogen (the highest IARC classification in humans) for cancers of the mouth, pharynx, larynx, oesophagus and liver (IARC 1988).

Nearly 10 years later, the review by the World Cancer Research Fund and the American Institute of Cancer Research in 1997 concluded that there was convincing evidence
(the highest level of evidence in this report) that alcohol increases the risk of mouth, pharyngeal, laryngeal and oesophageal cancers (WCRF & AICR 1997). This review also found convincing evidence that alcohol increases the risk of primary liver cancer, probably by way of alcoholic cirrhosis. It found probable evidence that alcohol increases the risk of colorectal cancer and breast cancer, even at very low levels of consumption. The report states that risk is a function of the amount of alcohol consumed (WCRF & AICR 1997; IARC 1988).

More recently, the evidence for a significant relationship between alcohol and female breast cancer has grown, with a number of reviews concluding that the risk of breast cancer increases with increasing alcohol consumption. An international collaborative meta-analysis including 53 epidemiological studies concluded that the relative risk of breast cancer increased by 7.1% (95%CI 5.5−8.7%) for each additional 10 g of alcohol consumed daily (Hamajima et al. 2002). An Australian meta-analysis concurred with the international review, finding a significant dose–response relationship for the development of breast cancer, even at low levels of consumption, and increasing risk with increasing age (Ridolfo & Stevenson 2001).

The most up to date and compelling review has just been released from IARC in 2007 and has confirmed that alcohol is a risk factor for the same cancers classified in 1988 and also for colorectal and breast cancer (IARC 2007).

The table below summarises the current state of evidence showing an association between alcohol and specific cancer sites. There is convincing evidence that alcohol increases the risk of cancer of the mouth, pharynx, larynx, oesophagus, colon, rectum, breast and liver (WCRF & AICR 1997; IARC 1988; English et al. 1995; Single et al. 1999; Bagnardi et al. 2001; Chapman 2003; Ridolfo & Stevenson 2001; IARC 2007).

The overall evidence suggests that alcohol is not a risk factor for cancers of the prostate, pancreas and bladder (WCRF & AICR 1997; IARC 1988; English et al. 1995; Single et al. 1999; Bagnardi et al. 2001; Chapman 2003; Ridolfo & Stevenson 2001; IARC 2007). For stomach, and lung cancer, the evidence is inconsistent or insufficient to conclude causality. For lung cancer, the studies generally do not adequately control for confounding from smoking.

Excessive alcohol consumption carries a strong social stigma in many populations and most surveys which ask people about the amount of alcohol they consume may substantially underestimate true levels of consumption (2000). This could result in an underestimation of the actual carcinogenic effect of the habit and therefore alcohol is possibly a stronger risk factor than perceived (Stewart & Kleihaus 2003).

Smoking and alcohol together have a synergistic effect on risk of cancers of the larynx, oropharynx and oesophagus (Jensen et al. 1996; Doll et al. 1999). This means the combined effects of smoking and alcohol greatly exceed the risk from either one of these factors alone. Alcohol and tobacco interact in a multiplicative way on the risk of cancers of the upper aero-digestive tract. For example, compared with the risk for non-smoking non-drinkers, the approximate relative risks for developing mouth and throat cancer are seven times greater for those who use tobacco, six times greater for those who use alcohol, and 38 times greater for those who use both tobacco and alcohol (Blot 1992).

This synergistic effect of alcohol and smoking has been estimated to be attributable for over 75% of cancers of the upper aero-digestive tract in developed countries (Blot 1992). Alcohol has an independent effect on the risk of oral, pharyngeal, laryngeal and oesophageal cancers, but it is its synergistic effect with smoking that is most significant.
There are also indications that alcohol and hepatitis B virus infection may exert a joint effect on cancer of the liver (Brechot, Nalpas & Feitelson 1996; Schiff 1997). Also of concern is the difference noted in liver cancer between Aboriginal Australians and the non-Aboriginal population; in a West Australian study the incidence and rate of deaths from liver cancer were 3.5 and 3.6 times higher for Aboriginal males than for non-Aboriginal males (Thompson & Irvine 2001). This highlights an important area for further investigation and action.

In conclusion, the association between alcohol consumption and an increased risk of some cancers has been confirmed. There is a dose–response relationship in most studies after controlling for potential confounders such as tobacco smoking, and the relations appear to hold for women as well as men. The relationship is not a straight line, but shows upward curvature at higher drinking levels (Edwards et al. 1995).

Table 1.12 Evidence of a link between alcohol and cancer

<table>
<thead>
<tr>
<th>Type of cancer</th>
<th>Association between alcohol and cancer</th>
<th>Level of evidence for causality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>Increases risk</td>
<td>Convincing</td>
</tr>
<tr>
<td>Larynx</td>
<td>Increases risk</td>
<td>Convincing</td>
</tr>
<tr>
<td>Liver</td>
<td>Increases risk</td>
<td>Convincing</td>
</tr>
<tr>
<td>Mouth</td>
<td>Increases risk</td>
<td>Convincing</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>Increases risk</td>
<td>Convincing</td>
</tr>
<tr>
<td>Pharynx</td>
<td>Increases risk</td>
<td>Convincing</td>
</tr>
<tr>
<td>Colon/rectum</td>
<td>Increases risk</td>
<td>Convincing</td>
</tr>
<tr>
<td>Lung</td>
<td>Potential risk</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Stomach</td>
<td>Potential risk</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Bladder</td>
<td>Inconsistent and insufficient evidence of a relationship</td>
<td>n/a</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Inconsistent and insufficient evidence of a relationship</td>
<td>n/a</td>
</tr>
<tr>
<td>Prostate</td>
<td>Inconsistent and insufficient evidence of a relationship</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Sources: Rehm et al. 2004; IARC 2007
How the amount of disease caused by alcohol is estimated

The amount of morbidity and mortality which is attributable to drinking alcohol in a population has typically been estimated using what may be referred to as the ‘population-attributable fraction method’. Since it is not possible to know about the drinking habits of all individuals who suffer from disease or injury, it is necessary to apply summary measures, based (in part) on collections of research studies, of the risk of developing or dying from a specific condition at various levels of consumption (i.e. relative risk or odds ratio) (Chikritzhs et al. 2002).

There are two methodological frameworks for quantifying morbidity and mortality attributable to alcohol:

- The first method is based on the relative risk of death or disease among low-risk, risky and high-risk drinkers when compared to non-drinkers.
- The second method is based on a comparison between risky, high-risk drinkers and low-risk drinkers and thus, unlike the first method, is not concerned with abstainers.

In order to estimate the population-attributable fraction due to alcohol for any specific condition, in addition to condition-specific relative risk estimates, it is also necessary to have accurate information on the prevalence of alcohol consumption in the community of interest. Both the framework for estimating relative risks and estimates of drinking prevalence can dramatically influence the population-attributable fraction. The range of variability can be demonstrated by comparing population-attributable fraction estimates made by English and colleagues (English et al. 1995) versus those made by Ridolfo and Stevenson (2001) in a more recent publication (see Table 1.13 below).

Ridolfo and Stevenson used non-drinkers as the reference group to estimate the contribution of low-risk, risky and high-risk alcohol consumption and applied drinking prevalence estimates from a 1998 national survey (Ridolfo & Stevenson 2001). English and colleagues used low-risk drinkers as the reference group and national consumption estimates from 1989/90: they were thereby confined to estimating morbidity and mortality due to risky and high-risk drinking only (English et al. 1995). As a direct result, population-attributable fractions due to alcohol for cancers—most of which include substantial risk at low levels of drinking when compared to abstinence—were relatively small compared to those estimated by Ridolfo and Stevenson. The rationale given for the English et al. approach was that it was consistent with the public health policy of minimising harm rather than achieving abstinence. Using low-risk drinkers as the reference group also avoids the need to incorporate protective effects of low level drinking on cardiovascular disease in mortality and morbidity estimates (Chikritzhs et al. 2002). It also avoids the difficulty of using as a reference group current abstainers, who may include both lifelong abstainers and ‘sick quitters’: those who stopped drinking when they developed health problems.

In order to address the uncertainty and variability in relation to alcohol aetiological fractions and subsequent mortality and morbidity estimates for Australia, a consortium of researchers attempted to establish a consensus position. They recommended that future estimates use abstainers as the reference group and that results be presented and disseminated in such a way that both the losses and savings in mortality and morbidity from each of the drinking levels could be distinguished—as opposed to a single estimate (Chikritzhs et al. 2002). This approach has subsequently been adopted by national costing studies and recent estimates of alcohol-attributable morbidity and mortality in Australia (e.g. Collins & Lapsley 2002; Chikritzhs et al. 2003) and is the most appropriate method for estimating the effect of alcohol-attributable cancers.
Table 1.13 Cancer site and percentage attributable to alcohol

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<td>Males %</td>
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<tr>
<td>Larynx</td>
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<td>Liver</td>
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<tr>
<td>Oesophagus</td>
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<td>6</td>
</tr>
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<td>Oropharynx</td>
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</table>

The impact

The harm caused by alcohol, such as the development of cancer and other illnesses and injuries, has been estimated at 4.9% of the total disease burden in Australia (Mathers, Vos & Stevenson 1999). At low to moderate intakes, alcohol consumption appears to reduce the risks of certain conditions, including ischaemic heart disease, stroke and gallstones. Taking into account these benefits, as well as the harms, alcohol is estimated to be associated with 2.2% of the total disease burden in Australia (Mathers, Vos & Stevenson 1999). This demonstrates the importance of distinguishing between the effects of drinking that are low-risk, risky (where the risk of harm increases beyond any possible benefit) and high-risk (where there is substantial risk of serious harm) (NHMRC 2001).

There is no evidence to suggest that alcohol may be protective for any form of cancer. Ridolfo and Stevenson estimated that in 1998, 1157 cancer deaths and 3171 hospitalisations were attributable to any level of alcohol consumption (Ridolfo & Stevenson 2001). The number of cancer deaths attributed to alcohol was greater than the combined total of all deaths attributed to any type of illicit drug (Ridolfo & Stevenson 2001). Over the years between 1992 and 2001, cancer was the third most common cause of alcohol-attributable death, with only road crash injury and alcoholic liver cirrhosis accounting for greater numbers of premature deaths (Chikritzhs et al. 2003).

Over half a million hospital episodes (577,269) were estimated to have been caused by risky or high-risk drinking in the years between 1993 and 2001 (Chikritzhs et al. 2003).

Deaths caused by alcohol contribute substantially to potential years of life lost, which is a measure of the gap in years between age of death and the age before which death is considered premature. It has been estimated that about 17 years of life are prematurely lost for every death caused by risky and high-risk drinking in Australia. This is equivalent to over 52,030 years of life lost every year from premature alcohol-attributable death (Chikritzhs et al. 2003).

Undoubtedly, alcohol-attributable cancers represent a substantial proportion of the burden of disease and injury in Australia. The financial cost of disease, injury and crime caused by alcohol in this country has been estimated to be in excess of $7.6 billion. The exact proportion attributable to cancer is not clear (Collins & Lapsley 2002).
The challenge

**Adults**
Alcohol is a significant cause of drug-related harm and is one of the highest preventable causes of death and hospitalisation in Australia (NEACA 2001). According to the 2004 National Drug Strategy Household Survey, some 9% of respondents aged 14 years or older drank alcohol daily, and 41% drank at least weekly (AIHW 2005). Thirty-three per cent of people drank less often but had drunk in the last 12 months. About 7% were ex-drinkers and about one in 10 people sampled had never had a full serve of alcohol (AIHW 2005).

In 2004, about 21% of all those surveyed reportedly drank at risky or high-risk levels for short-term harm, compared to about 10% who were at risk of long-term harm. One in 10 Australians surveyed reported drinking at levels considered risky or high risk for both short- and long-term harm in the previous 12 months. Males (24%) were more likely to have consumed alcohol in a risky or high-risk fashion for short-term harm than females (17%) (AIHW 2005).

Substantial amounts of alcohol are consumed at levels above the National Health and Medical Research Council guidelines for short-term harm. In 2001, some 62% of all alcohol consumed by Australians aged 14 years and older was drunk during a single drinking session which exceeded low-risk levels for episodic drinking (e.g., binge drinking). For younger age groups (both males and females) this proportion was substantially higher and ranged between 78% and 85%. About 44% of all alcohol reported to have been drunk in 2001 was consumed by people who were at risk or high risk of the long-term effects of drinking (e.g., various cancers) (Chikritzhs et al. 2003).

**Teenagers**
Experience with alcohol is common among secondary school students, with use increasing with age (White & Hayman 2006). By the age of 15 around 90% of students had tried alcohol, and by age 17, 70% of students had drunk alcohol in the month prior to the Australian School Students Alcohol and Drug (ASSAD) survey. The proportion of students drinking in the week prior to the survey increased with age, from around 16% of those aged 13 to about half of those aged 17 years. At age 13, about 2% of students reported having drunk beyond low-risk levels for short-term harms; by age 17 the proportion of students drinking at risky and high-risk levels for short-term harms increased to about 21% (White & Hayman 2006). Analyses of national survey data has also shown that the proportion of females aged between 14 and 17 years who drank at risky/high-risk levels for long-term harms increased from 1% in 1998 to 9% in 2001. Among males of the same age, there was a small decline from 4.3% to 2.7% over the same years (Chikritzhs, Pascal & Jones 2004).

**Aboriginal and Torres Strait Islander peoples**
Aboriginal and Torres Strait Islander Australians are more likely to abstain from alcohol than the general population, nevertheless, alcohol-related problems are of particular concern for these peoples. The most reliable national survey of Aboriginal and Torres Strait Islander drinking levels to date (Chikritzhs & Brady 2006) has estimated that about 51% of Indigenous Australians drink at risky or high-risk levels compared to about 11% among the non-Indigenous population (AIHW 1995). Deaths from alcohol-attributable conditions are about two and a half times greater for Aboriginal and Torres Strait Islander peoples when compared to the general population (Chikritzhs & Brady 2006) and males tend to have higher levels of consumption than females (AIHW 1995). The consumption of cheap cask
wine is of particular concern for Aboriginal peoples living in rural and remote regions (Gray et al. 2000).

**Trends**

In general, from 1998 to 2001, the estimated proportion of the population consuming alcohol at risky/high-risk levels for chronic harm remained relatively stable among males and females of all ages, with an increase among girls aged 14 to 17 years and a small decline among young males being the main exceptions (Chikritzhs et al. 2003).

Adult per capita pure alcohol (i.e. ethanol) consumption in Australia has remained relatively stable over the past decade and has most recently been estimated at about 9.0 litres, placing Australians in 22nd place in world rankings (WARC 2004). Beer consumption contributes to the bulk of all alcohol consumed in Australia, although there has been a substantial shift from regular to mid/low-strength beers since a tax saving for lower strength beers was introduced by the Australian Government. The market share of wine has increased dramatically since the 1960s but has remained relatively stable in recent years (World Drink Trends 2003).

**Effective interventions**

Public health policies on reducing alcohol consumption have a strong evidence base, which derives from research and interventions not necessarily directly related to cancer control.

Work in various countries has demonstrated public health measures of proven effectiveness in the following areas:

- retail price influences on alcohol consumption and taxation of alcohol as a prevention strategy
- access to alcohol and the effects of availability on consumption and alcohol-related problems
- restricting advertising and marketing of alcohol
- public safety and drinking within particular contexts such as driving or attendance at sporting venues
- community supported intervention programs which focus on enforcing laws in relation to legal minimum purchase age and drinking to intoxication
- giving information about alcohol through mass media campaigns and labelling
- individually directed interventions (e.g. brief intervention by general practitioners and treatment of alcohol dependence by pharmacotherapies or psychosocial interventions).

Successful community-based interventions are typically those which are supported by the community itself, that are evidence-based and provided with adequate access to relevant expertise, infrastructure and human resources. A multi-component approach with a focus on reducing alcohol availability and increasing effective enforcement are fundamental to the success of community-based interventions (Loxley et al. 2004).

The National Alcohol Strategy 2006 to 2009 is a plan for action, designed to reflect the National Drug Strategic Framework and developed through collaboration between governments, non-government organisations, industry partners and the broader Australian community. The goal of the National Alcohol Strategy is to prevent and minimise alcohol-related harm to individuals, families and communities in the context of developing safer
Section One: Preventable risk factors

and healthy drinking cultures in Australia. The National Alcohol Strategy has focused on four priority areas: intoxication, public safety and amenity, health impacts, and cultural place and availability (National Alcohol Strategy 2006).

The policy context

It is interesting to note that at the current time, Australia has two sets of alcohol recommendations produced by the National Health and Medical Research Council.

The National Health and Medical Research Council considers the effects of alcohol on cancer in the Australian alcohol guidelines: health risks and benefits developed in 2001 (NHMRC 2001). In these guidelines the National Health and Medical Research Council notes, ‘There is clear evidence to show that alcohol is associated with an increased risk of cancer overall and that it is a cause of cancer of the mouth, throat and oesophagus. In addition, the evidence suggests that it may also play a role in other specific cancers. In particular, further research is needed to clarify the possible role of alcohol in relation to breast cancer and bowel cancer’ (p. 74). The National Health and Medical Research Council emphasises that, ‘Unlike cardiovascular disease, there is no evidence that alcohol has any protective effect against cancer, at any level’ (p. 74). Also, in relation to heart disease, ‘The benefits of alcohol in preventing heart disease can be achieved with as little as half a standard drink per day ... Similar benefits can also be gained from strategies such as regular exercise, giving up smoking and a healthy diet’ (pp. 68 & 69).

Moreover, recent research suggests that the protective effect of alcohol on cardiovascular disease may have been exaggerated and many studies which have demonstrated an apparent increase in cardiovascular disease among non-drinkers have applied faulty methods and are subject to substantial measurement error (Fillmore et al. 2006).

Thus, National Health and Medical Research Council Guideline 12 is also relevant:

- **People who choose not to drink alcohol should not be urged to drink to gain any potential health benefit and should be supported in their decision not to drink.**
- Guideline 1(a) states: To minimise risks and gain benefits in the longer term:
- Men should drink an average of no more than four standard drinks a day, and no more than 28 standard drinks per week
- Women should drink an average of no more than two standard drinks a day, and no more than 14 standard drinks per week.

An Australian standard drink contains 10 g of alcohol (e.g. 425 ml light beer, 285 ml regular beer, 100 ml wine, 60 ml fortified wine, or 30 ml spirits or liqueurs).

The National Health and Medical Research Council Dietary guidelines for Australian adults released in 2003 have set a lower recommended level of alcohol consumption based on the energy density of alcohol contributing to weight problems (NHMRC 2003). The dietary guidelines advise adults:

**Limit your alcohol intake if you choose to drink.**

*Because of alcohol’s effect on both short- and long-term health, and because of the additional kilojoules it provides in the diets of a society with increasing rates of obesity, adults—if they drink at all—should limit their average daily intake of alcohol to no more than two standard drinks a day for men and one standard drink a day for women.*
The Cancer Council supports these lower recommendations for alcohol (as specified in the National Health and Medical Research Council Dietary guidelines for Australian adults) as drinking at these levels is both more appropriate for preventing obesity and decreasing the risk of all-cause mortality and cancer. The Cancer Council recommends that, to reduce the risk of cancer, alcohol consumption should be limited or avoided. For people who do drink alcohol, The Cancer Council recommends the following:

- For men—an average of no more than two standard drinks a day.
- For women—an average of no more than one standard drink a day.

One of the primary aims of the National Alcohol Strategy is to improve health outcomes among all individuals and communities affected by alcohol. To achieve this objective in relation to cancer, The Cancer Council Australia and member cancer councils support the priority areas and actions outlined in the National Alcohol Strategy to reduce alcohol-related harms and health consequences.

The role of 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 their general practitioner (GP) every year (RACGP 2005).

However, a review of primary care interventions in relation to alcohol gives mixed results. While there seemed to be evidence that GP intervention was effective (NHMRC 1996), this has become less clear in recent years. There still appears to be strong recognition of the potential for the GP to act as an intervention point (RACGP 2005; Loxley, Toumbourou & Stockwell 2005) and research is now tending to focusing on how to engage and train general practice to be more effective in providing alcohol advice (Funk et al. 2005; McCambridge et al. 2004). Certainly as a single point of intervention, evidence for efficacy is weakest. However as part of a multi-layered approach that includes policy, community and family interventions there is more potential for success in reducing at-risk levels of alcohol consumption (Holmwood 2002; Loxley, Toumbourou & Stockwell 2005).

The Royal Australian College of General Practitioners has produced three significant publications relating to the role of general practice and alcohol. 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 patients should be asked about the quantity and frequency of alcohol intake and number of alcohol-free days each week from 14 years of age and those with at-risk patterns of alcohol consumption should be offered brief advice to reduce their intake. Frequency of assessment varies depending on level of risk identified. All patients should be asked about frequency and intake every three years; those with an increased risk (such as people with high blood pressure, liver disease, pregnancy, etc.) should be asked and given brief advice every 12 months. Patients who report exceeding the recommended frequency and intake should be followed up monthly with a brief counselling intervention tailored to reduce alcohol consumption. Drug therapy is recommended for those patients who are physically or psychologically dependant or those with psychological, physical or social consequences of excessive alcohol consumption, and these patients should be followed up at each visit.

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 alcohol (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 a healthy lifestyle and reducing harmful levels of alcohol, the Commonwealth Department of Health and Ageing, in the 2003/04 budget, funded the Lifestyle Prescriptions program (commonly known as Lifescrpts). Lifescrpts 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.

**Existing recommendations**

There are a number of initiatives and evidence-based materials that point the way in policy directions on alcohol control in Australia. Some of the documents and programs that The Cancer Council supports and aims to complement are highlighted below.

- The *Dietary guidelines for Australian adults*, released in 2003 (see discussion above) (NHMRC 2003).
- The *Australian alcohol guidelines: health risks and benefits* (NHMRC 2001). The Cancer Council has developed a lower set of recommendations for safe drinking levels than what is recommended in these guidelines and supports a revision of these guidelines to better reflect the growing knowledge of the relationship between alcohol and cancer.

**Aims**

The Cancer Council’s aims are to:

- increase awareness of the link between alcohol consumption and cancer risk among health authorities, health professionals and the community
- encourage efforts to reduce alcohol consumption.

<table>
<thead>
<tr>
<th>What needs to be achieved</th>
<th>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased awareness of the link between alcohol and cancer among the general public and key health professionals</td>
<td>Monitor and clarify best evidence on the relationship between alcohol and cancer causation</td>
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<tr>
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<td>Ensure alcohol information in key messages is promoted to the public and relevant health professionals in publications, presentations, programs, media statements and where opportunities arise</td>
</tr>
<tr>
<td>Effective coordinated policy development and implementation</td>
<td>Develop and maintain evidence-based policy positions about the relationship between alcohol and cancer</td>
</tr>
<tr>
<td></td>
<td>Ensure effective and coordinated policy development and implementation</td>
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<td>Identify, analyse and advocate for evidence-based policy initiatives to reduce alcohol consumption</td>
</tr>
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<td>Promote healthy policies in relation to alcohol consumption</td>
<td>Act as a role model in the safe consumption of alcohol</td>
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An increased capacity to monitor epidemiological trends
Support and conduct high quality epidemiological research further clarifying the relationship between alcohol and cancer

An increased capacity to monitor behavioural trends
Support and conduct high-quality behavioural research to determine if increased knowledge about the link between alcohol and cancer will affect behaviour, and what sorts of messages should be communicated in any social marketing campaigns about responsible use of alcohol.
Conduct research to identify barriers and enabling factors for implementation of these recommendations in general practice and other health settings.

References

Alcohol


Section One: Preventable risk factors


National Health and Medical Research Council (NHMRC) 2003. *Dietary guidelines for Australian adults*. Canberra: NHMRC.


Section Two:
Screening to detect cancer early
Principles of screening

Screening refers to the application of a test to a population which has no overt signs or symptoms of the disease in question, to detect disease at a stage when treatment is more effective. The screening test is used to identify people who require further investigation to determine the presence or absence of disease and is not primarily a diagnostic test.

The purpose of screening an asymptomatic individual is to detect early evidence of an abnormality or abnormalities such as pre-malignant changes (e.g. by Pap test) or early invasive malignancy (e.g. by mammography) in order to recommend preventive strategies or treatment that will provide a better health outcome than if the disease were diagnosed at a later stage.

It is a commonly held belief among health professionals and the community that ‘early diagnosis’ of cancer is beneficial and therefore screening is bound to be effective. However, it cannot be assumed that each person who has a screen-detected abnormality or cancer within a screening program will benefit from that diagnosis. For example, it is now understood that a substantial proportion of early abnormalities on Pap tests (i.e. dysplastic changes) will regress without treatment. The potential benefits of organised population screening program for cancer must thus outweigh any potential harms that may result in the use of a screening test in people who are otherwise well (Miller 1996) and there must be strong evidence, preferably from randomised trials, that a screening program is effective in reducing mortality from cancer.

Principles for the introduction of population screening

The accepted criteria for the assessment of evidence on benefits, risks and costs of cancer screening are the principles adopted by the World Health Organization (Wilson & Jungner 1968):

- the condition should be an important health problem
- there should be a recognizable latent or early symptomatic stage
- the natural history of the condition, including development from latent to declared disease, should be adequately understood
- there should be an accepted treatment for patients with recognised disease
- there should be a suitable test or examination that has a high level of accuracy
- the test should be acceptable to the population
- there should be an agreed policy on whom to treat as patients
- facilities for diagnosis and treatment should be available
- the cost of screening (including diagnosis and treatment of patients diagnosed) should be economically balanced in relation to possible expenditure on medical care as a whole, and
- screening should be a continuing process and not a ‘once and for all’ project.

Recommendations for or against population screening interventions are influenced by the relative strength of the available scientific evidence in relation to these criteria. Most importantly, there should be sufficient direct evidence from well-conducted studies that
early detection improves health outcomes, and that the benefits of screening outweigh any potential harms.

Australia currently has three population screening programs for cancer which meet the World Health Organization criteria. Screening programs for breast, cervical and bowel cancer are discussed in the following chapters. Two further chapters examine the evidence for screening for prostate cancer and melanoma and conclude that, at this stage, there is insufficient evidence to recommend population screening.

The condition
For the disease to be amenable to screening, there must be a latent stage or ‘window’ during which it would be possible to detect the disease before it reaches an advanced stage. Most cancers are slow growing and many have a pre-invasive or precursor stage during which early treatment is successful in halting progression to invasive cancer. For example, pre-malignant lesions of the cervix can be detected by regular Pap tests. However, the sites of many cancers are not easily visualised and potential screening tests are insufficiently accurate, so that screening asymptomatic people is ineffective in detecting early disease.

If detection of cancer at an early stage is possible, it is crucial that appropriate intervention at that time has the potential to alter the course of the disease. Ideally there should be strong evidence from well-conducted clinical trials that early treatment or intervention improves outcome.

Estimation of benefit from early detection on health outcome may be influenced by lead-time bias and length-time bias.

Lead-time bias refers to the apparent improvement in survival that is seen when screening advances the time of diagnosis without any change in the actual time of death. In this case, increased survival merely reflects a greater period of time that the individual is aware of the presence of cancer.

Length-time bias refers to the tendency of screening to detect a disproportionate number of cases of slowly progressing cancer compared with more aggressive cases. Rapidly growing cancers may progress from being undetectable at the time of screening to symptomatic during the interval between screens and thus are less likely to be detected at screening or at an early stage.

The screening test (from Miller 1996 p. xiii)
The screening test must be sufficiently accurate to detect the condition earlier than in the absence of screening. Accuracy is measured by considering sensitivity and specificity of the screening test.

‘Sensitivity’ refers to the ability of a test to correctly identify people who have disease i.e. the proportion of people with the disease at the time of screening who have a positive screening test. A test with poor sensitivity will miss cases (persons with disease) and will produce a large number of false negative results (true cases will be told incorrectly that they are free of disease).

‘Specificity’ describes the ability of the test to correctly identify people who do not have the disease. A test with poor specificity will result in a high rate of false positives (healthy persons will incorrectly test positive and may be subject to more invasive diagnostic testing).
Another useful characteristic of a screening test is the positive predictive value (PPV), which is the likelihood of having disease if the screening test is positive (i.e. true positive). The PPV depends on the sensitivity and specificity of the test, and whether the condition is common or rare in the population being screened. In the context of breast cancer screening, for example, the PPV represents the total number of cancers diagnosed as a proportion of women who have been recalled for further investigations after mammography screening.

Finally, the screening test must be acceptable to the population and cause minimal discomfort, or participation in the screening program will be low. For example, many women find having a Pap test uncomfortable or embarrassing and are subsequently under-screened. Substantial resources are consequently required for educational campaigns to encourage women to undergo Pap tests. Pain on compression is reported by a small number of women undergoing mammographic screening. Resources are devoted to radiographer training to address this issue.

Ethical issues in population screening: balance of benefits and harms

‘The ethical imperative with all medical interventions is to endeavour to ensure that potential benefits will outweigh harm. This is particularly so of screening. If a patient asks a doctor for help the doctor is obliged to do his or her best to help but … (if) … the doctor initiates a screening program there is a presumption that this must benefit the patient’ (Fowler & Austoker 1997 p. 1585).

It is very difficult to determine the benefit of screening for an individual. The distinction between benefits to the community and to individuals needs to be borne in mind when considering recommendations to participate in organised population screening programs.

Participants in screening programs are ostensibly healthy people, so a program should, at the very least, be able to demonstrate evidence of an overall benefit to the community and a minimum of risk that certain individuals may be disadvantaged by the program (Miller 1996). Not only is it important that information on the effectiveness of screening programs be available, it should also be disseminated widely. Regular monitoring and evaluation of screening programs is also vital to ensure that effectiveness is maintained and improved where possible.

Potential harms from screening

It is essential to recognise that an organised population approach to screening, which ultimately achieves a net health benefit to a community, can result in adverse outcomes for some individuals.

There is a risk that people who receive false negative results may experience delays in diagnosis and treatment. Some may develop a false sense of security and ignore warning symptoms. Increasingly, false negative results can give rise to legal action by people whose cancers appear to have been missed.

A false positive result can mean that people without the disease undergo follow-up testing that may be uncomfortable, expensive, and, in some cases, potentially harmful. Rarely, this can lead to unnecessary treatment. There may be psychological consequences such as anxiety for both the patient and their family.

For example, a woman with a false positive mammogram undergoing surgical investigation (e.g. a fine needle biopsy) incurs costs such as anxiety, time lost to the procedure, and possible adverse effects of the surgery. A person undergoing a colonoscopy as a result of a
false positive faecal occult blood test faces the possibility of a bowel perforation during the procedure. This risk might be as high as 1 in 1000 (Winawer et al. 1997).

**Informed consent**

As screening is initiated by ‘the health system’, individuals invited to participate must be informed, prior to any testing, of potential adverse effects as well as the potential benefits.

There are concerns that false negative results can give rise to legal action by people whose cancers appear to have been missed. It is important that it is understood that screening for any disease is never 100% effective and a negative result does not ever constitute a guarantee that an individual is free of disease. This must be communicated effectively to the potential participants in a screening program to allow informed consideration of their involvement before any test is done. Communications must address differences in literacy and language competency to ensure that individuals are properly informed.

**Economic issues in screening**

Implementation of possible screening programs will be influenced by consideration of the equal distribution of limited resources across the whole community for maximum benefit. Resources allocated to a screening program will lower resources available for other health needs.

Determining the costs of screening involves the costs of the test and subsequent diagnostic tests and the costs associated with any hazard of the test as well as the costs of over-treatment

**balanced against**

reduced costs of therapy for the primary condition, reduced costs associated with less expenditure on the treatment of the advanced disease, and the economic value of the additional years of life gained (Miller 1996 p. 1444).

**References**


Breast cancer in Australia

In 2005, breast cancer was estimated to be the most common cancer (apart from non-melanoma skin cancer) diagnosed in women in Australia, with 12,957 new cases diagnosed. It is estimated that this will increase to 14,818 new cases in 2011 (AIHW, AACR, NCSG & McDermid 2005). Breast cancer was also the most common cause of cancer death among Australian women in 2005, with 2,719 deaths recorded (ABS 2007). Between 1990 and 2005, the rate of deaths from breast cancer decreased by about 2% per year (ABS 2007; AIHW 2005).

The risk of developing and dying from breast cancer increases with age. In 2005 approximately 23% of women with breast cancer were aged under 50 years, 51% were aged between 50 and 69 years and 26% were aged 70 years and over. A woman has one chance in eight of being diagnosed with breast cancer before the age of 85 (AIHW, AACR, NCSG & McDermid 2005).

Figure 2.1 illustrates the trends in breast cancer incidence and mortality in Australia and shows that there have been increases in incidence and falls in mortality for each age group, with the largest changes occurring in women aged 50 to 69 years. Incidence in the 50 to 69 years age group increased from 197.1 new cancers per 100,000 women in 1987 to 304.0 per 100,000 women in 2002. The rapid increase in the detection of breast cancer between 1991 and 1995 corresponds to the introduction of a national screening program which detects cancers that would otherwise not be identified until later (AIHW, AACR, NCSG & McDermid 2005).

Age-standardised mortality rates for women aged 50 to 69 years have declined since 1993. The mortality rate for women in this target group was 66.8 deaths per 100,000 women in 1993, fell to 56.9 deaths per 100,000 women in 2002.
1987, compared to 51.3 deaths per 100,000 women in 2004. A similar pattern of decline in mortality rates occurred in women aged 70 and over, while rates for women under 50 years remained consistently below 15 deaths per 100,000 women over the period 1987–2001 (AIHW & NBCC 2006).

Can breast cancer be prevented?

Despite epidemiological evidence of possible risk factors for breast cancer, at this stage there is limited potential for prevention. Most risk factors are not readily amenable to change, while lifestyle-related factors that could potentially be modified are associated with only a small proportion of breast cancer risk. It is important to acknowledge that most of these risk factors are not established causes of disease, instead serving as surrogate markers to differentiate individuals at different levels of risk.

Apart from being female, the strongest risk factor for breast cancer is age; in Australia in 2005 the estimated rates of breast cancer varied from 1.5 per 100,000 in women aged 20 to 24 years, to 7.4 per 100,000 in women aged 25 to 29 years, to 305.7 per 100,000 in women aged 80 to 84 years (AIHW, AACR, NCSG & McDermid 2005).

Having a mother, sister or daughter and/or father, brother or son who has had breast cancer also increases the risk of breast cancer; the more first-degree relatives affected and the younger the age of diagnosis, the higher the breast cancer risk. Despite the strength of family history as a risk factor for breast cancer, inherited genetic susceptibility accounts for only about 5% of cases; for eight out of nine women who develop breast cancer, there is no strong family history of the disease (CGHFBC 2001).

Two important genes have been identified that are associated with an inherited susceptibility to breast and ovarian cancer: BRCA1 and BRCA2. Variations in other genes have also been associated with breast cancer risk (Singletary 2003).

Other risk factors that are not easily modified include early menarche, late menopause, and no children or a first child at 30 years or older (Singletary 2003; NBCC 2006).

Breastfeeding is also associated with a reduction in the risk of breast cancer, with women’s risk decreasing by 4.3% for each year they breastfeed (CGHFBC 2002).

Studies have demonstrated that use of hormone replacement therapy (HRT) is associated with an increased risk of breast cancer that increases with duration of therapy and age (Baber, O’Hara & Boyle 2003; Million Women Study Collaborators 2003; Gertig et al. 2003; Rossouw et al. 2002). There is some suggestion that women taking HRT also have an increased risk of dying from breast cancer (Million Women Study Collaborators 2003). A recent comprehensive Australian review suggests little or no increase in risk for oestrogen-alone HRT but an increased risk for combination HRT containing oestrogen and progesterone (NHMRC 2005). Based on the review and Australian incidence figures, it has been estimated that four additional breast cancers will be seen per 1000 women in their 50s taking combination HRT for five years. The risk decreases with time after cessation of treatment. A reanalysis of more than 50 studies on oral contraceptives and breast cancer found a small increase in the risk of developing breast cancer, but this risk returned to normal within 10 years of discontinuing oral contraceptives (CGHFBC 1996).

Modifiable lifestyle factors have also been shown to have various associations with breast cancer. There is convincing evidence that alcohol consumption of more than two standard drinks a day increases the risk of breast cancer (WCRF & AICR 1997; NBCC 2006). It has been estimated that in Australia, approximately 5% of breast cancers are attributable to
alcohol consumption (NBCC 2006). There is evidence of a dose–response relationship with alcohol consumption, with the relative risk of breast cancer increasing by 7.1% for each additional 10 g per day of alcohol (CGHFBC 2002). (Refer also to the alcohol chapter.)

Diet, physical activity and the maintenance of a healthy weight may play some role in protecting against breast cancer. Various reviews have found moderate to weak evidence of the cancer-protective effect of vegetables and fruit (WCRF & AICR 1997; UK Department of Health 1998).

The World Health Organization estimates that 10% of breast cancer worldwide can be attributed to physical inactivity (WHO 2002). An Australian appraisal of the impact of physical inactivity suggests that the population-attributable risk for breast cancer is 9% (Stephenson et al. 2000).

A number of reviews have concluded that there is now clear evidence that physical activity can protect against breast cancer (IARC Working Group 2002; Thune & Furberg 2001). The risk reduction is around 20% to 40%. The association has been reported for both pre- and postmenopausal women, but it is as yet unclear which time period(s) in a woman’s lifespan are most important for physical activity in the development of breast cancer (IARC Working Group 2002).

Overweight and obesity in postmenopausal women are also associated with increased risk of breast cancer (Singletary 2003); there is an increase in risk of around 30% in women with a body mass index at or above 28 kg/m² compared to those with a body mass index below 21 kg/m² (Boyle et al. 2003).

The potential for chemoprevention of breast cancer (in particular oestrogen receptor positive cancers)—through the use of selective oestrogen receptor modulators such as tamoxifen and raloxifene and, more recently, aromatase inhibitors—is undergoing investigation in randomised controlled trials. Evidence suggests that tamoxifen and raloxifene can reduce the risk of breast cancer by about 50%. However, as tamoxifen is associated with an increased risk of endometrial cancer, blood clots, uterine bleeding, hot flushes and other menopausal symptoms, the potential benefits of tamoxifen do not outweigh the potential risks in otherwise well women (Cuzick et al. 2003). The use of raloxifene appears to be associated with fewer side effects. None of these drugs is currently approved for prevention of breast cancer in Australia.

Tests and programs for breast cancer

**Mammography**

Screening mammography is the best method available for detecting breast cancer early (IARC 2002). It is the only tool we have for early detection that has been shown to reduce population mortality from breast cancer.

Research on the effectiveness of mammography screening for breast cancer has occurred through randomised controlled trials in North America and Europe. These trials have indicated that the natural history of breast cancer can be interrupted and mortality reduced through the detection of invasive disease when tumours are small and at an early stage. In addition, mammography in the context of an organised population screening program is effective in the detection of a large proportion of early tumours in asymptomatic women. The International Agency for Research on Cancer concluded that routine mammographic screening reduced risk of dying of breast cancer by 25% in women aged 50 to 69 years (IARC 2002).
**Breast self-examination**

Breast self-examination (BSE) as a method of early detection has come under considerable scrutiny.

Evidence from meta-analyses (Kosters & Gotzsche 2003; Hackshaw & Paul 2003; Humphrey et al. 2002) and randomised controlled trials (Thomas et al. 2002; Semiglazov et al. 2003) shows that BSE does not result in a reduction in the size or stage of tumours at diagnosis or a decrease in mortality from breast cancer. Findings from a UK study that enrolled a cohort of women comparable to the Australian population demonstrated no impact of BSE on mortality after 16 years of follow-up (UK Trial of Early Detection of Breast Cancer Group 1999).

**Breast awareness**

In Australia, even with a fully established mammographic screening program, more than half of all breast cancers are found by a woman or her doctor after noticing a change in the breast. Although screen-detected breast cancers are typically smaller, the majority of non-screen-detected breast cancers are found at an early stage and treated conservatively (i.e. with surgery that removes as little of the breast as possible). This supports efforts to promote early detection beyond the mammographic screening program (RACGP 2005, 2006a & 2006b).

In the absence of proof that routine, systematic BSE reduces deaths from breast cancer across the population, the National Breast Cancer Centre and The Cancer Council Australia advocate a ‘breast awareness’ approach to encourage women to report new or unusual breast changes. This involves women being familiar with the normal look and feel of their breasts, so they may be better able to recognise an unusual change.

Breast awareness encourages familiarity as part of general body awareness and health care. No specific technique or regularity is promoted, as there is no evidence of the effectiveness of any one approach.

Because many breast cancers cannot be felt, the breast awareness approach should be seen as a supplement to—not a substitute for—regular mammograms in women within the target age range for mammographic screening.

**Clinical breast examination**

The effectiveness of clinical breast examination (CBE) as a screening method has also been questioned. The International Agency for Research on Cancer concluded that ‘there is inadequate evidence that screening with clinical breast examination, whether alone or in addition to screening mammography, can reduce mortality from breast cancer’ (IARC 2002).

The National Breast Cancer Centre’s position statement on the early detection of breast cancer (NBCC 2004) summarises the latest evidence. For asymptomatic women at average risk of breast cancer there is insufficient evidence to encourage CBE as a population screening tool. However, as there is no evidence to discourage the practice of CBE, individual women may wish to discuss their specific needs with their doctors. Those at high risk should discuss ongoing monitoring with their doctors. Options may include CBE.
The policy context

The national breast cancer screening program, BreastScreen Australia, began in 1991 (BreastScreen Australia 2004a). It is funded by the Australian Government (Giles & Amos 2003) and co-funded and administered by state and territory governments. BreastScreen services operate under and are measured against the BreastScreen Australia National Accreditation Standards (BreastScreen Australia 2004a). The standards are used not only to drive quality improvement but also to balance the costs and benefits of the program to women in the target age group. It is a free service that targets asymptomatic women aged 50 to 69 years and is accessible to all women aged 40 years or above. Women in the target age range are sent reminders for repeat screens every two years. No doctor’s referral is required to attend screening, which is performed by two-view mammography. All mammograms are independently reviewed by two readers, with recall for further assessment of any abnormalities detected during film reading. The screening services are delivered through specialised units, either fixed or mobile, that operate as part of a designated BreastScreen Screening and Assessment Service, which carries out multidisciplinary assessment of screen-detected abnormalities. All procedures up to the definitive cytological or histological diagnosis of breast cancer are undertaken within BreastScreen Australia.

Women in the target group are recruited through direct mail-outs based on the electoral roll, community education, advertising campaigns, brochures and health care providers (AIHW 1998). The Cancer Council supports recruitment of women through the activities of its state and territory cancer councils in community education, promotional literature and the Cancer Council Helpline. State and territory cancer councils also support BreastScreen Australia through professional education and by running cancer registries that monitor and evaluate the program in relation to cancer rates and mortality.

BreastScreen Australia performance

Participation rate

Monitoring and evaluation are important for BreastScreen Australia. The most recent national data on breast cancer screening in Australia is in the BreastScreen Australia monitoring report 2003–04 (AIHW 2007).

The total number of women screened by BreastScreen Australia over the two years 2003–04 was 1,627,115, of whom 70.3% were in the target age group (50 to 69 years). The proportion of the target group screened (the participation rate) is at 55.6% (2003–04).

There was some variation between participation rates in the states and territories, from a low of 44.4% in the Northern Territory to a high of 63.1% in South Australia.

<table>
<thead>
<tr>
<th>Rate %</th>
<th>Australia</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>WA</th>
<th>SA</th>
<th>Tas</th>
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<td></td>
<td>55.6</td>
<td>50.1</td>
<td>58.8</td>
<td>58.2</td>
<td>56.5</td>
<td>63.1</td>
<td>57.3</td>
<td>51.8</td>
<td>43.4</td>
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Source: AIHW 2007

The Australian Bureau of Statistics National Health Survey data show that 64% of Australian women report having a mammogram every two years (ABS 2002). While not all mammograms will be for cancer screening purposes, this figure suggests that
a significant proportion of women are having mammograms outside the BreastScreen Australia program. This is of some concern to The Cancer Council because it means data are not recorded and the effects of screening for these women are not evaluated. If mammography screening is to be successful, it must be provided within an organised program that adheres to key standards of quality.

**Small invasive cancer detection rate**

This measures the rate of invasive breast cancers of 15 mm or less diagnosed in women attending BreastScreen Australia. It is expressed as the number of small cancers detected for every 10,000 women screened. In 2004, 64% of all invasive breast cancers among all women aged 40 or over were 15 mm or less. The age-standardised rate for the target group was 39.1 per 10,000 women for first-round screening and 26.8 per 10,000 women for subsequent rounds for women aged 40 years and over.

**Program sensitivity: interval cancer rate**

Program sensitivity is the proportion of invasive breast cancers that are detected by BreastScreen Australia out of all invasive cancers (interval cancers and screen-detected cancers) diagnosed in program-screened women during the screening interval. A low interval cancer rate suggests a successful program. An interval cancer is an invasive breast cancer that is diagnosed after a screening episode that detected no cancer and before the next scheduled screening episode.

The age-standardised interval cancer rate for women in the target group 0–12 months after attending their first screen in 2000–02 was 9.6 per 10,000 following their first screen and 10.1 per 10,000 following subsequent screens.

**Detection rate of ductal carcinoma in situ**

This indicator measures the rate of ductal carcinoma in situ (DCIS) diagnosed in women attending BreastScreen Australia. The ability to detect DCIS reflects good quality imaging and screen film reading. In 2004 the age-standardised DCIS detection rate for women in the target age group was 19.8 per 10,000 women and in subsequent rounds it was 10.4 per 10,000 women. (For more on DCIS, see below.)

**The role of general practice**

The role of general practice in breast cancer screening is potentially important, given that 86% of the population have at least one visit with the general practitioner every year (RACGP 2005).

General practitioners and general practice team members can contribute to promoting preventive health behaviours and identifying women at increased or high risk of developing breast cancer. Promoting breast awareness, mammography screening and individualised surveillance programs where appropriate are recognised activities of general practice as outlined in policy and guideline documents produced by Royal Australian College of General Practitioners (RACGP 2005, 2006a, 2006b). Findings from a national survey of well women indicated that GP recommendations to their female patients aged 50 to 69 to have a screening mammogram increased from 35% in 1995 to 62% in 2003. (Barratt et al. 1997; NBCC 2005)
Potential benefits and adverse effects of breast cancer screening

Screening aims to detect a significant proportion of breast cancers that are small and of a low grade, enabling better health outcomes from earlier treatment (AIHW, AACR & NBCC 1999). Research has clearly demonstrated a significant benefit from population mammography screening for women in the target age group. It has been estimated that for every 1460 women screened, 13.5 biopsies and 7.4 breast cancers detected; one death from breast cancer is prevented (AIHW, BreastScreen Australia & NCSP 1999). Screening 10,000 women in this age group is estimated to prevent approximately 10 to 20 deaths from breast cancer over 10 years (UK Trial of Early Detection of Breast Cancer Group 1999).

Mortality benefits from the screening program, if they occur, will not be seen until five to 10 years after a high participation rate is achieved. If 70% of Australian women in the target group participated in the screening program, death rates from breast cancer for women over 50 years offered screening would fall by approximately 25% to 30% (AHMAC 1990).

Screening may reduce the trauma associated with treatment. Tumours diagnosed at an earlier stage and smaller size require less extensive surgery and chemotherapy.

Potential adverse effects of screening

Mammographic screening may have adverse psychological effects for some women. Of particular concern is increased anxiety experienced as a result of false negative and false positive results (see introduction to Section 2). The potential negative physical and psychological effects associated with a false positive test include anxiety induced by fear of being diagnosed with breast cancer, physical effects of the performance of invasive diagnostic procedures, diagnosis of non-lethal lesions, and exposure to radiation.

DCIS (where the cancerous cells have not spread beyond the basement membrane of the breast ducts—described as non-invasive cancer) is often quoted as an example of an ‘over-diagnosed’ breast condition. As recently pointed out by Professor David Roder: ‘The difficulty is that there is no way currently known to define in-situ lesions with any certainty as progressive or non-progressive. This definition cannot be made by looking under the microscope. The potential for over-diagnosis has arisen from statistical inferences, which are themselves based on assumptions. Differences in estimates are a function of differences in the assumptions made by researchers, much of which are uncertain and open to debate’ (GP review 2006).

While the diagnosis and treatment of DCIS is still contested, and general reports suggest that women found through mammographic screening to have DCIS will be treated by surgery and/or radiotherapy without evidence of the benefits of treatment having been established (Rickard 1996), it should be noted that BreastScreen Victoria (2001) reports a steady decline in the proportion of women diagnosed with DCIS undergoing surgery. The issues about DCIS should not overwrite the effectiveness of the national breast cancer screening program in identifying invasive carcinoma of the breast.

Who should be screened?

Evidence of greatest benefit exists for the target age group (women aged 50 to 69 years). The Cancer Council recommends that all women in this age group have a mammogram every two years through BreastScreen Australia. Debate, however, is increasing around the benefit of extending screening to women in the decades either side of this age bracket.
An Australian review of the benefits of screening women aged 40 to 49 years concluded that there is less benefit in screening these women. The benefit is greater for those at the older end of the age bracket, and for those with a strong family history of breast cancer. The benefit of screening women aged 40 to 49 years is estimated at approximately one-third of that of women aged 50 to 69 years (Irwig et al. 1997). BreastScreen Australia policy states:

*BreastScreen Australia selects women for screening on the basis of age alone. Women aged 40 years and above are eligible. Recruitment strategies will be targeted at women aged 50–69 years. The age for screening will be monitored and reviewed as new data becomes available* (BreastScreen Australia 2004a).

With increasing life expectancy, the value of screening women over 70 years has also come under investigation. Barratt et al. (2002) estimate that the benefit of screening women aged 70 to 79 years to be about 40% to 72% of that achieved in women aged 50 to 69 years; this declines further with increasing age and when quality-of-life adjustment is made. They estimate that extending screening to women aged 70 to 79 years is relatively cost-effective and similar to the cost-effectiveness of extending screening to women aged 40 to 49 years. The authors, however, also comment that the estimation of benefits, harms and costs would be improved with data—now lacking—from randomised trials in the appropriate age group.

**Aims**

The Cancer Council endorses the major aims of the BreastScreen Australia program (AIHW, BreastScreen & NCSP 1999):

- to ensure that the program is implemented in such a way that significant reductions can be achieved in morbidity and mortality attributable to breast cancer
- to maximise the early detection of breast cancer in the target population
- to ensure that screening for breast cancer in Australia is provided in dedicated accredited screening and assessment services as part of the BreastScreen Australia program
- to ensure equitable access for women aged 50–69 years to the program
- to ensure that services are acceptable and appropriate to the needs of the eligible population
- to achieve high standards of program management, service delivery, monitoring and evaluation and accountability (BreastScreen Australia 2004b).
<table>
<thead>
<tr>
<th>What we want to achieve</th>
<th>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</th>
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<tr>
<td>A 70% two-yearly participation rate in the national program by women in the target group (50–69 years) and access on request to the program for women aged 40–49 years and 70 years or more</td>
<td>Maintain and support education programs to raise awareness in the community and among health professionals to promote informed participation of women aged 50–69 years in breast cancer screening. Advocate for government support, including adequate funding, to ensure targets for participation are met, while maintaining a focus on equity and access for women. Priority should be given to maximising the participation of Australian Aboriginal and Torres Strait Islander women and women of culturally and linguistically diverse backgrounds. Recognising that many women have mammograms outside BreastScreen, advocate for integration of screening of all asymptomatic women aged 50–69 years into the BreastScreen Australia program.</td>
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<tr>
<td>Referral to appropriate treatment services and collection of information about the outcome of treatment</td>
<td>Recognising the importance of providing consistent high-quality care for women diagnosed with breast cancer in Australia: • support or advocate for examination of the extent to which women diagnosed in the screening program are being treated in accordance with the NHMRC Clinical practice guidelines for the management of early breast cancer (2001), Management of advanced breast cancer (2001) and Clinical Practice Guidelines for the Psychosocial Care of Adults with Cancer (2003). Recognising the importance of informed consumer involvement in all aspects of breast cancer screening, diagnosis and management, advocate for active roles for consumers within peak breast cancer bodies in Australia.</td>
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<td>Sufficient workforce capacity to ensure the delivery of a best practice screening program to the target population (women 50–69)</td>
<td>Recognising the implications in the short and longer term of radiography and radiology workforce constraints for BreastScreen Australia, advocate for increased funding to provide additional places for the training of radiographers and radiologists.</td>
</tr>
<tr>
<td>Timely evaluation of new technologies</td>
<td>Monitor development of relevant new technologies, (such as digital mammography and MRI), advocate for rapid evaluation of their relevance for screening and adoption of those that are positively evaluated.</td>
</tr>
<tr>
<td>National evaluation of BreastScreen performance, capacity and policy issues by 2008</td>
<td>Support and contribute to national evaluation of the following areas: • reductions in breast cancer mortality due to screening, risks associated with screening, program governance and management, performance trends, accreditation system • workforce, new technologies and capacity issues • policy issues such as the appropriate target age range, screening interval, and screening of women at higher risk or those who present with symptoms.</td>
</tr>
</tbody>
</table>
References

Breast cancer


Cervical cancer

In Australia, a vaccine that prevents the majority of cervical cancer is now available. The vaccine will have a profound impact on Australia’s cervical screening program, and in the future will influence changes to national policy. However, Pap tests will remain important in preventing cancer of the cervix.

Cervical cancer in Australia


Between 1991 (when Australia’s National Cervical Screening Program commenced) and 2005, the incidence of cervical cancer among women aged 20 to 69 halved from 17.2 per 100,000 women to 7.3 in 2005 (AIHW, AACR, NCSG & McDermid 2005). The mortality rate has also declined from 4.0 in 1991 to 1.8 in 2004 (AIHW 2006), and is now among the lowest in the world (IARC 2002).

Mortality data from 2001 to 2004 in Queensland, South Australia, Western Australia and the Northern Territory indicate that Indigenous women have a mortality rate attributable to cervical cancer of 9.9 per 100,000 women. This is more than four times the corresponding death rate of non-Indigenous women (2.1 per 100,000 women) (AIHW 2006).

Can cervical cancer be prevented?

The human papilloma virus (HPV) has been identified in 99.7% of cervical cancer specimens (Walboomers et al. 1999). While HPV is clearly necessary for the development of cervical cancer, it is certainly not sufficient (Walboomers et al. 1999). Worldwide, there are estimated to be 326 million adult women who are infected with HPV. This compares with approximately 450,000 new cases of cervical cancer worldwide each year (Bosch 2000). Clearly cervical cancer is a very rare outcome of HPV infection.

HPV is a sexually transmitted infection and almost all individuals become infected with HPV within two to five years of initiating sexual activity (Wright et al. 2006). HPV can be classified into high and low-risk types based on the strength of their association with cervical cancer. Co-factors that increase the risk of cervical cancer progressing in women who have a persistent high-risk HPV infection include exposure to tobacco smoke, more than five full-term pregnancies, the use of oral contraceptives for five years or more, immunosuppression, and presence of antibodies to Chlamydia trachomatis or to herpes simplex virus type 2 (IARC 2005).
A vaccine to prevent HPV infection
A vaccine designed to prevent two of the most common types of high-risk HPV (HPV 16 and 18) is available in Australia, and from April 2007 was included on the National Immunisation Schedule.

HPV types 16 and 18 are responsible for up to 70% of cervical cancers (Munoz et al. 2003), and clinical trials have found the vaccine to be 100% effective (Wright et al. 2006). The vaccine is highly effective when given to females who are not already infected with the HPV types included in the vaccine. Therefore, it is recommended that the vaccine be administered prior to commencement of sexual activity (Wright et al. 2006). As the vaccine does not protect against all types of HPV that cause cervical cancer, vaccinated women should have regular Pap tests.

In sexually active women, the most important measure to prevent cervical cancer is regular Pap tests.


Screening tests and programs for cervical cancer

The Pap test
Cervical cancer is one of the few cancers where screening can detect precancerous cell growth. These abnormalities can be treated, preventing the development of cancer. The Pap test (named after its developer, Dr George Papanicolaou) is the most widely used cancer screening test in the world (Eurogin 2003). Typically, cervical cancer takes 10 years or more to develop. Abnormalities detected by a Pap test can be monitored, or, if required, further investigated and early treatment initiated.

Cervical screening with the Pap test began in British Columbia (Canada) in 1949. Although no randomised controlled trials evaluating screening have been conducted, a large number of observational studies have shown a strongly protective effect of screening (USPSTF 1996). In particular, substantial declines in mortality and incidence of cervical cancer have been demonstrated after the introduction of screening programs.

Other screening technologies
In the past decade, a desire to improve the sensitivity of the Pap test and an increased understanding about the role of HPV has led to the development of new screening technologies.

Liquid-based cytology
Liquid-based cytology is a technique where the cervical cells collected on the sampling instruments are suspended in liquid. At the laboratory the liquid sample is filtered to remove unnecessary material such as blood, bacteria and other matter. The cells are then deposited as a single layer onto a slide, stained and examined under a microscope.

As new technologies are evaluated for adoption, appropriate consideration must be given to how they will improve the cervical screening program in terms of sensitivity, specificity, cost-effectiveness and quality of life. An Australian Government review in Australia by the Medical Services Advisory Committee in 2002 concluded that there is insufficient
evidence to suggest that liquid-based cytology is superior to the conventional Pap test, and recommended that public funding not be supported for this screening test in Australia at this time (MSAC 2002). Further research is ongoing into the use of this technology.

**HPV DNA testing**

Due to the relationship between persistent infection with high-risk types of HPV and the development of cervical cancer, testing for the presence of HPV DNA in cervical cell specimens has the potential to identify women at increased risk of developing cervical cancer. Commercially available HPV DNA testing kits can detect 13 high-risk types of HPV.

Several countries have developed guidelines recognising the role of HPV testing as a primary screening test and in the management of abnormal cervical cell abnormalities (Cox & Cuzick 2006). The International Agency for Research on Cancer states that it is likely longer screening intervals could be achieved using HPV DNA testing as a screening test (IARC 2005). Currently in Australia, HPV DNA testing is recommended for use in women following treatment of a high-grade abnormality. The test is used to determine whether the virus has been cleared from the body (NCSP 2005).

International studies continue to investigate the role of HPV DNA testing for triaging low-grade cervical abnormalities and as a primary screening tool.

**The policy context**

In Australia, screening for cervical cancer was introduced on an ad hoc basis in the 1960s.

Guidelines on cervical screening programs published in 1986 by the World Health Organization and the International Agency for Research on Cancer were used as a basis for a review of cervical screening in Australia. The review was conducted on behalf of Australian Health Ministers Advisory Council (AIHW, BreastScreen Australia & NCSP 1999).

Following this review, cervical screening was organised into a structured program known today as the National Cervical Screening Program; this was implemented in 1991 as a joint initiative of the Australian, state and territory governments.

State and territory cancer organisations have been involved in a coordinating role in the establishment of state Pap test registries and recruitment of women to the screening program. In some states and territories, cancer councils maintain an important role in cervical screening programs.

**Existing recommendations**

The National Cervical Screening Program policy developed in 1991 provides guidelines for which women need screening and how often screening should occur. It states:

1. Routine screening with Pap tests should be carried out every two years for women who have no symptoms.

2. All women who have ever been sexually active should start having Pap tests between the ages of 18 and 20 years, or one or two years after beginning sex, whichever is later. In some cases, it may be appropriate to start screening before 18 years of age.

3. Pap tests may cease at the age of 70 years for women who have had two normal Pap tests within the last five years. Women over 70 years who have never had a Pap test, or who request a Pap test, should be screened (Cervical Cancer Prevention Taskforce 1991).
It is anticipated that the introduction of the HPV vaccine will, in the future, influence changes to this national policy.

Recent changes to guidelines

Women with abnormal Pap test results should be managed in accordance with the National Health and Medical Research Council guidelines Screening to prevent cervical cancer: guidelines for the management of asymptomatic women with screen detected abnormalities (NCSP 2005). After extensive review, these guidelines were endorsed by the National Health and Medical Research Council in 2005 and came into effect in July 2006.

Pap test quality

One indicator of Pap test quality is the proportion of tests where an endocervical component is present. Presence of an endocervical component in 80% of Pap tests is generally considered acceptable. It is sometimes difficult to obtain the endocervical component when taking a Pap test in older women. There is some indication that the proportion of Pap tests lacking an endocervical component has increased over time. In Victoria, this has increased from 17.3% in 2000 to 22.1% in 2005 (VCCR 2006).

The role of general practice

In Australia, approximately 80% of Pap tests are taken by GPs (AIHW & AACR 2004) and therefore GPs play an important role in cervical screening in this country. GPs also play an important role in recruiting women who have never had a Pap test or are significantly under-screened.

In November 2001, the Australian Government introduced a cervical screening Practice Incentive Payment to support general practices to enhance cervical cancer screening. The program has a number of components. Accredited practices receive a payment on registering for the scheme. GPs also receive a Special Incentive Payment when they perform a Pap test from unscreened and under-screened women aged between 20 and 69 years. Finally, in order to encourage general practices to adopt a systematic approach to cervical screening, practices receive an outcomes payment when they reach a target screening rate (NCSP 2006). In May 2006, 91.7% of practices in Australia were signed on to participate in these activities (Medicare Australia 2006).

Potential benefits and adverse effects of cervical cancer screening

Rationale

It has been estimated that screening using the Pap test has the potential to reduce squamous cell carcinoma of the cervix by up to 90% (AIHW, BreastScreen Australia & NCSP 1999).

In Australia, the age-standardised incidence rate for cervical cancer declined by an average of 6.2% each year between 1991 and 2001. Mortality rates have also fallen by an average of 5.2% per year since 1991 (AIHW & AACR 2004). These gains can be attributed, in part, to the success of the National Cervical Screening Program.
Potential adverse effects

No screening test is 100% accurate. A Pap test every two years is about 90% accurate and is currently the best available protection against cervical cancer for women who have ever had sex. Like all screening tests, the Pap test is performed on asymptomatic women. False positive results as well as false negative results may occur.

Even minor abnormalities can cause anxiety for some women. Women who receive false negative results may experience delays in diagnosis or treatment. False negative results may also create a false sense of security that may cause warning symptoms to be ignored.

Who should be screened?

All women who have ever been sexually active should commence having Pap tests between the ages of 18 and 20 years, or within two years after beginning sex, whichever is later (Cervical Cancer Prevention Taskforce 1991).

Who has been screened?

Cervical cytology registers in Australia provide information on the majority of women who undergo screening, although an estimated 1% to 3% of women choose not to be included on the register (AIHW, BreastScreen Australia & NCSP 1999). In the two years between January 2003 and December 2004, the participation rate for cervical cancer screening in Australia was 60.7% for the target population of women aged 20 to 69 years (AIHW 2006).

Table 2.2: Participation rates in the National Cervical Screening Program by age group, Australia 2003–04

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<td>64.0</td>
<td>66.6</td>
<td>57.2</td>
<td>49.6</td>
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Source: AIHW 2006

Participation in screening is highest in the age groups 30–34 to 55–59 but declines sharply after the age group of 55–59. The participation rate across the age groups 40–69 increased slightly in 2003–04 compared to 2001–02 (AIHW 2006).

Australia’s two-yearly screening interval is conservative, with many countries recommending three years or more between tests. The International Agency for Research on Cancer recommend three-yearly screening for women aged 25 to 49 and five-yearly screening for women aged 50 to 64 (IARC 2005)—a recommendation that the NHS Cervical Screening Programme in the United Kingdom has recently adopted. Data from Victoria show that if participation in cervical screening is measured over a three-year time interval, then the participation rate in women aged 20 to 69 years is close to 80% (VCCR 2006).

Adherence to the recommended two-yearly screening interval is not optimal. Among women who received a negative Pap test report in February 2000, 26.2% were re-screened before two years had elapsed (AIHW 2006). Early re-screening increases the cost of the program and reduces cost-effectiveness.
Recruitment

Women in the target age group are recruited by a variety of initiatives determined mainly at the state/territory level.

Recruitment strategies are implemented for particular population sub-groups, such as older women, Australian Aboriginal and Torres Strait Islander women and women from culturally diverse backgrounds (AIHW, BreastScreen Australia & NCSP 1999).

Aims

The Cancer Council aims to maximise participation in the cervical screening program of eligible women and contribute to improvements in the program.

<table>
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<tr>
<th>What we want to achieve</th>
<th>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</th>
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| Maximum screening participation of eligible women | Promote and foster participation in cervical cancer screening, particularly among women in under-screened populations  
Collaborate with Indigenous communities to improve rates of cervical screening among Australian Aboriginal and Torres Strait Islander women  
Develop systems to ensure that data are collected on Indigenous status to enable evaluation of program effectiveness  
Work with all relevant health professionals to reduce early re-screening  
Work with all relevant health professionals and consumers to increase adherence to the updated guidelines: Screening to prevent cervical cancer: guidelines for the management of asymptomatic women with screen detected abnormalities (NCSP 2005) |
| Maximum vaccine uptake among eligible girls and young women and ensure screening messages remain visible | Promote participation in HPV immunisation programs to eligible girls and young women, with particular emphasis on population groups most at risk, such as Indigenous communities  
Work with all relevant health professionals and consumers to ensure women are aware that, vaccinated or not, Pap tests remain important in preventing cancer of the cervix |
| Ongoing evaluation of the effectiveness and efficiency of the screening program, so as to inform policy and program development | Advocate for, and contribute expert advice to, the review of evidence in relation to:  
• a change in national policy following the introduction of the HPV vaccine  
• a change to the screening interval and age at first screen  
• investigation of new technologies  
• timely implementation of review findings |
References

**Cervical cancer**


National Health and Medical Research Council (NHMRC) 2005. *Screening to prevent cervical cancer: guidelines for the management of asymptomatic women with screen detected abnormalities*. Canberra: NHMRC.


Bowel cancer is the most common potentially fatal cancer in Australians and is expected to increase in incidence by more than 30% over the next five to 10 years as our population ages. Population-based screening for bowel cancer, currently being introduced in Australia, can reduce mortality by 30% to 40% in people screened.

Bowel cancer in Australia

Bowel cancer, also known as colorectal or large bowel cancer, is a major health problem in Australia. One in 18 men and one in 25 women is likely to develop the disease. In 2005, there were estimated to be 14,237 new cases of bowel cancer—7,765 in men and 6,472 in women—representing 14.5% of all new cases of cancer (excluding non-melanoma skin cancer). The incidence rate rises steadily with advancing age and most cases occur after the age of 50. Between 1991 and 2005, age-adjusted rates of bowel cancer incidence remained steady in men and slowly increased in women. In the 10-year period 2001–11, the number of new cases of bowel cancer is projected to increase by about one-third (AIHW, AACR, NCSG & McDermid 2005).

In 2005, there were 4171 deaths in Australia from bowel cancer: 2330 in men and 1641 in women. Bowel cancer was the second most common cause of death from cancer overall, as well as being the third most common cause of death from cancer in men (after lung and prostate cancers) and the third most common in women (after breast and lung cancers) (ABS 2007). Between 1991 and 2005, the death rate for bowel cancer fell by 2.5% per annum for men and by 2.6% for women (ABS 2007; AIHW 2005). Despite the trend towards better survival, bowel cancer remains an important cause of premature death in Australia.

In Indigenous communities, where incidence rates are believed to be under-recorded, bowel cancer is the third most common cancer affecting men and the fourth most common affecting women (ABS & AIHW 2005). The survival rate from bowel cancer is lower for Indigenous than non-Indigenous Australians (Condon et al. 2004). It is also recognised that Aboriginal people and Torres Strait Islanders often have co-morbidities that may hinder the effectiveness of cancer treatments (Valery et al. 2006).

Can bowel cancer be prevented?

Evidence shows that bowel cancer is associated with a number of modifiable and unmodifiable risk factors.

Important risk factors that cannot be addressed through lifestyle or behavioural change include a personal history of bowel cancer, advanced adenoma, chronic inflammatory bowel disease or a strong family history of bowel cancer (ACN Revision Committee...
Two specific syndromes, which have a defined inherited genetic basis, are familial adenomatous polyposis (FAP) and hereditary non-polyposis colorectal cancer (HNPPC). HNPPC (also known as Lynch Syndrome) is also associated with an excess of cancers at other sites, including the endometrium and ovary. Clinical surveillance of individuals with these risk factors, as set out in The Cancer Council Australia’s Australian Cancer Network Clinical practice guidelines for the prevention, early detection and management of colorectal cancer, is recommended.

Bowel cancer is also being increasingly linked to lifestyle and in recent decades, there has been considerable interest in identifying modifiable risk factors.

The main focus of research into preventable risk factors associated with bowel cancer has been in relation to diet (including nutritional supplements), body weight and lifestyle factors such as physical activity, intake of aspirin and other non-steroidal anti-inflammatory drugs, and smoking (ACN Revision Committee 2005). A comprehensive overview of diet and cancer, published in 1997, estimated that changes in diet and physical activity could reduce the incidence of bowel cancer by 66% to 75% (WCRF & AICR 1997). (See the chapters on alcohol, nutrition, obesity and physical activity for more information.)

Obesity, particularly central (around the waist) obesity, is an independent risk factor for bowel cancer and adenomas (IARC Working Group 2002; MacInnis et al. 2004).

A number of studies have shown that smoking is a risk factor for bowel cancer and precancerous adenomas (Kune et al. 1992; Chao et al. 2000; Giovannucci 2001; Limburg et al. 2003; Anderson et al. 2003). The report from the Cancer Prevention Study II estimated that, in the US, approximately 12% of deaths from bowel cancer among both men and women were attributable to smoking (Chao et al. 2000).

The review released from IARC in 2007 has confirmed that alcohol is a risk factor for the same cancers classified in 1988 and also for colorectal and breast cancer (IARC 2007). Aspirin has been shown to have potential in preventing bowel cancer (Sandler et al. 2003; Benamouzig et al. 2003; Chan et al. 2005). Findings from the Nurses’ Health Study and the Women’s Health Study indicate that the benefit is not evident until after more than a decade of regular aspirin consumption (Chan et al. 2005; Cook et al. 2005). Adverse effects of aspirin include acute upper gastrointestinal bleeding (Weil et al. 1995). After reviewing research into the effects of aspirin and non-steroidal anti-inflammatory drugs, the Australian Cancer Network stated that ‘it is reasonable to consider aspirin as prophylaxis in adenoma bearers’ but that ‘aspirin has not had broad scientific approval for use as a colorectal tumour chemo-preventive in individuals at average risk, because of uncertainties about the optimal dosage and duration of use, and adverse effects’ (ACN Revision Committee 2005).

General practitioners and their teams have an important role in bowel cancer prevention. As they see 86% of the Australian population every year, they ‘have enormous potential to encourage patients to take greater responsibility for their health’ (RACGP 2006). Australian Doctor surveyed 1246 Australians in 2006, with 56% reporting they would act on advice from their GP in relation to lifestyle changes such as losing weight, quitting smoking and doing more exercise: all shown to reduce the risk of bowel cancer (Howe 2006).

The Royal College of General Practitioners has published two key documents to support preventive work in general practice. The Guidelines for preventive activities in general practice (the ‘red book’) (RACGP 2005) is a guide listing who is most at risk, and evidence-based recommendations for screening or preventive care for a number of conditions including cancers. The other is Putting prevention into practice: guidelines for the implementation of prevention in the general practice setting (the ‘green book’) (RACGP 2006). While there is evidence to show the benefits of GP preventive activities, there are many barriers, including the lack of time in typical general practice consultations. Solutions
could focus on: how to use this time most effectively; the role of e-health measures such as follow-up, recall, and desktop prompts; non-GP measures such as practice nurse involvement; and non-clinical staff measures such as utilising waiting room opportunities.

Tests and programs for bowel cancer

Rationale
Population-based screening provides an important opportunity to reduce bowel cancer mortality and morbidity. The combination of prevention measures, such as those outlined above, and population-based screening, has even greater potential to reduce the impact of bowel cancer in Australia.

Research indicates that most bowel cancers develop from adenomatous polyps (adenomas); a small adenoma may grow into advanced cancer over an estimated 10 years. It should be recognised that it is common for middle-aged or elderly people to have one or more adenomas, most of which (estimated at around 19 out of 20) never progress to cancer.

Adenomas are described as ‘advanced’ when certain features, such as larger size (10 mm or more in diameter) are present. These features act as markers of greater likelihood of progression to cancer and greater risk for cancer elsewhere in the large bowel. Once cancer has developed, growth may occur gradually over 12 to 24 months or even longer. While the cancer remains confined to the bowel wall (stage A), surgical resection gives cure rates around 90% (ACN Revision Committee 2005).

Most people with advanced adenomas and many with early stage cancer experience none of the symptoms that would alert them or their doctor to the presence of bowel cancer. For people diagnosed with bowel cancer, the pathological stage of development of the tumour at the time of diagnosis, as well as the treatments that follow, will affect their prognosis. Survival rates for bowel cancer are strongly related to stage, with five-year case survival rates found in South Australia (where statewide data is available) to be:

- 88% for Stage A, when the cancer is contained within the bowel wall
- 70% for Stage B, when the cancer has extended through the bowel wall, but with no lymph nodes affected
- 43% for Stage C, when the cancer is present in the lymph nodes
- 7% for Stage D, when the cancer cannot be removed by surgery or has spread to other areas of the body.

There is an upward trend in these survival figures, due to a number of factors, including improvements in surgical technique and more widespread use of adjuvant chemotherapy and radiotherapy (ACN Revision Committee 2005).

The two objectives of bowel cancer screening are 1) to prevent cancer by identifying and removing precancerous, advanced adenomas and 2) to diagnose and treat early stage, curable cancer.

The evidence on screening for bowel cancer was reviewed in a report for the Australian Health Technology Advisory Committee (AHTAC 1997). The report concluded that the efficacy of screening based on the faecal occult blood test had been demonstrated, and that the best approach to mass screening of the Australian population required definition:
such as pilot studies to assess acceptance by the target population, feasibility and cost-effectiveness.

**Guidelines for the prevention, early detection and management of bowel cancer**, incorporating the Australian Health Technology Advisory Committee recommendations on screening, were developed by the Australian Cancer Network and endorsed by the National Health and Medical Research Council in 1999 (NHMRC, COSA & ACN 1999) and again in 2005 (ACN Revision Committee 2005).

Three screening tools for the early detection of bowel cancer are commonly available: the FOBT, sigmoidoscopy, and colonoscopy (ACN Revision Committee 2005). Two other tools—computerised tomographic (CT) colonography (also known as virtual colonoscopy) and faecal DNA testing—may have a future role in screening but are still undergoing evaluation (Van Dam et al. 2004; Cotton et al. 2004; Davies, Miller & Coleman 2005; Osborn & Ahlquist 2005).

**Faecal occult blood tests (FOBTs)**

Cancers in the large bowel have a tendency to produce low-grade bleeding (Macrae & St John 1982; St John et al. 1992). The detection of blood in small (often not visible) concentrations in the faeces provides the basis for use of FOBTs in screening for bowel cancer.

With FOBTs, blood can be detected through the chemical or immunochemical properties of haem and haemoglobin. The chemical tests, most of which use guaiac-impregnated slides as the test system, depend on detection of the chemical activity of haem. Certain foods and medications have the potential to interfere with test results so dietary modification may be required—usually avoiding red meat and vitamin C supplements for several days. The immunochemical tests utilise antibodies to human globin and are not affected by diet or medications. (For further discussion of the properties of the tests refer to Young, Macrae & St John 1996; Young et al. 2002.)

FOBTs are simple tests that can be done at home. Depending on the particular test, samples are collected from either two or three bowel actions. The samples are then sent to a laboratory for analysis to check for the presence of blood. As bleeding may be intermittent, the presence of blood in even one sample should be investigated by colonoscopy (see below).

Bowel cancer will be identified in 5% to 10% of those with a positive FOBT, an adenoma will be identified in another 20% to 35%, and bleeding will be due to a non-neoplastic cause such as haemorrhoids in the remainder. However, as shown by FOBT-based randomised controlled trials and other large studies, the likelihood of finding bowel cancer is between 12 and 40 times greater in a person with a positive FOBT than in someone whose test shows no evidence of bleeding (Mandel et al. 1993; Mandel et al. 1999; Alexander & Weller 2003).

A false negative result from the FOBT (i.e. no bleeding detected in a person who actually has bowel cancer or an advanced adenoma) may occur because of intermittent blood loss, uneven distribution of blood in the faeces or, in the case of chemical tests, because of intake of vitamin C supplements (Young, Macrae & St John 1996). The choice of FOBT also affects false negative rates, as different tests may have different thresholds for detection of blood, and therefore for cancer. The chemical test used in the European randomised controlled trials has a sensitivity for cancer of only 50% (Hardcastle et al. 1996; Kronborg et al. 1996) whereas many newer chemical and immunochemical tests have a sensitivity for cancer in the range 70% to 90% (Allison et al. 1996).
Periodic testing is recommended, as a negative (i.e. normal) result does not rule out the possibility of future development of bowel cancer. Evidence from the European randomised controlled trials, which used a low-sensitivity test repeated two-yearly for 10 years, suggests that this approach would lead to a reduction of 15% to 18% in mortality from bowel cancer among those offered screening (Hardcastle et al. 1996; Kronborg et al. 1996). The reduction in mortality was estimated to be 30% to 40% among those who actually performed the test (Jorgensen, Kronborg & Fenger 2002; Scholefield et al. 2002).

**Sigmoidoscopy**

Sigmoidoscopy involves tube examination of the rectum and the lower part of the colon (i.e. the section of large bowel closest to the anus). The sigmoidoscope may be rigid (best suited for examining the rectum) or flexible (reaching into the lower part but unable to examine the upper part of the colon).

Flexible sigmoidoscopy allows examination of the area where 55% to 60% of bowel cancers and advanced adenomas occur (AHTAC 1997). When abnormalities are detected, a tissue sample (biopsy) can be collected for pathological examination. The sensitivity for detection of neoplastic lesions depends on the proficiency of the sigmoidoscopist. Adenoma detection rates were shown to vary considerably between examiners in several large studies (Atkin et al. 2004; Pinsky et al. 2005), highlighting the need for comprehensive training and the auditing of outcomes. In 2005, an international task force issued detailed recommendations to assist with quality improvement (Levin et al. 2005).

Evidence from several case–control studies indicates that screening by flexible sigmoidoscopy should lead to a substantial reduction in the death rate from bowel cancer (Selby et al. 1992; Newcomb et al. 1992). Major randomised controlled trials using flexible sigmoidoscopy for screening are currently underway in the US, UK and Italy (Gohagan et al. 2000; UKSSTI 2002; Segnan et al. 2002). Progress results from the three trials show the screening procedure to be feasible, safe and well accepted (Weissfeld et al. 2005; Wardle, Miles & Atkin 2005; Segnan et al. 2002).

The Australian Health Technology Advisory Committee report stated that the evidence is sufficient to warrant consideration of sigmoidoscopic screening as an alternative (or a complement) to FOBT screening, but noted that mortality data from the randomised controlled trials will not be available for several more years (AHTAC 1997).

**Colonoscopy**

A colonoscope is similar to a flexible sigmoidoscope but is much longer. Interest in using colonoscopy as a screening tool relates to its ability to detect a very high proportion of bowel cancers and advanced adenomas by examination of the entire length of the large bowel. It allows biopsies to be taken from any suspected abnormalities as well as enabling most adenomas and some polyoid cancers to be completely removed during the examination.

Many studies have shown that colonoscopy has around 95% sensitivity for detection of cancer (Leaper et al. 2004; Robertson et al. 2005; Singh et al. 2006). The sensitivity for detection of adenomas varies according to their size and site within the large bowel (Rex et al. 1997). As with sigmoidoscopy, sensitivity for detection of lesions depends on the proficiency of the examiner, again highlighting the need for comprehensive training and the auditing of outcomes. In 2002, the US Multi-Society Task Force on Colorectal Cancer produced a detailed report on key performance indicators for colonoscopy (Rex et al. 2002).
Colonoscopy is the recommended follow-up test for those with positive findings at FOBT or screening sigmoidoscopy. It is also recommended as the primary tool for cancer surveillance in people with an increased risk of bowel cancer. When it is not possible to examine the total length of the bowel by colonoscopy, a CT colonography or barium enema should be performed.

The overall appropriateness of colonoscopy as the primary tool in population screening is much less certain. Acceptability of the procedure is limited by its invasive nature and the need for vigorous bowel preparation and sedation. The feasibility of providing colonoscopy for the five million Australians at average risk is also doubtful, given the high cost of the procedure, workforce and other logistic issues, and the required diversion of resources away from other health services.

Of even greater importance, there is no high level evidence to support use of colonoscopy in population screening (ACN Revision Committee 2005). In 2001, the Canadian Task Force on Preventive Health Care stated that there was insufficient evidence to include or exclude colonoscopy as an initial screening test in people at average risk (CTFPHC 2001). Similarly, in 2002, the US Preventive Services Task Force was unable to find direct evidence that screening colonoscopy was effective in reducing the bowel cancer mortality rate (USPSTF 2002).

The policy context

In 1999, in line with the Australian Health Technology Advisory Committee and the National Health and Medical Research Council recommendations, the National Cancer Control Initiative developed a proposal for a feasibility study for bowel cancer screening in the general population (NCCI 1999). The recommendations were formulated by an expert group that included representatives of the cancer councils. In response to this proposal, funds were set aside in the May 2000 federal budget to mount a four-year national feasibility study based on biennial screening using immunochemical FOBTs.

The Population Screening Section of the Department of Health and Ageing then assumed responsibility for planning the National Bowel Cancer Screening Pilot Study. The Health Insurance Commission (known as Medicare Australia), cancer councils, and many other interested groups participated in the planning process. Three pilot sites—Mackay in Queensland, and defined suburbs in Adelaide and Melbourne—were chosen for the feasibility study, which was conducted between November 2002 and June 2004. The Pilot Evaluation Report concluded that a nationally coordinated bowel cancer screening program in Australia would be feasible, acceptable and cost effective (Healthcare Management Advisors 2005).

In the 2005/06 federal budget, the Australian Government announced that it would provide $43.4 million over three years (including $7.8 million for the precursor pilot programs) to phase in a nationally coordinated, population-based bowel cancer screening program. The Department of Health and Ageing formed a new Bowel Cancer Screening Section to develop and coordinate the program.

In August 2006 the Government confirmed that the National Bowel Cancer Screening Program would begin by inviting people who turn 55 or 65 years of age between 1 May 2006 and 30 June 2008, and those who were invited to participate in the pilot, to complete an FOBT in their own home and return it by post to a laboratory for analysis. (Australia Post gave its approval.) Following consultation with state and territory governments, invitations to eligible participants would be issued on either a postcode or birth date basis and delivered through the mail. Nearly one million people were expected to be invited to
participate in the initial phase; the first invitations were issued in Queensland on 7 August 2006.

A national bowel cancer screening register is set up within Medicare Australia. The register is responsible for issuing invitations and FOBTs, monitoring all data and arranging follow-up notifications for participants who receive positive FOBT results but do not have colonoscopies. It also runs the national Information Line.

According to the Government, program implementation will be incremental and influenced by funding availability and healthcare system capacity, including colonoscopy and surgical services in each state and territory. The results of the first phase of National Bowel Cancer Screening Program are expected to be reviewed prior to the 2008/09 federal and state/territory budgets. This review is expected to guide decisions about further implementation of the program.

The Cancer Council fully supports and applauds the Australian Government’s introduction of a national bowel cancer screening program using faecal occult blood testing. As the program takes shape across Australia, the Cancer Council encourages all governments to ensure issues of access, quality and equity remain paramount. The availability of timely, high-quality colonoscopy following a positive FOBT will be an important issue affecting the success of the program, particularly in rural and remote areas where access may be limited.

Appreciating the need for gradual implementation in the first instance, the Cancer Council encourages the Australian Government to make the necessary commitments, to ensure that the program becomes available to as many at-risk Australians as possible, in the shortest possible time.

No upper age limit has been set for screening. Decisions about continued participation by the elderly are likely to be based on their personal preference and general state of health, and the perceived balance between benefits of screening and harms related to the follow-up investigations required in those with positive screening tests.

**Screening for people at increased risk of bowel cancer**

The Australian Health Technology Advisory Committee report on colorectal cancer screening noted that a national approach to population screening for people without symptoms would need to be complemented by a national policy for groups potentially at increased risk for bowel cancer: individuals with a family history of bowel cancer, or a personal history of bowel adenoma, bowel cancer or inflammatory bowel disease (AHTAC 1997). GPs are well positioned to determine bowel cancer risk on the basis of family history and to instigate appropriate management, again consistent with guidelines (RACGP 2005; ACN Revision Committee 2005; McMurrick, Dorien & Shapiro 2006).

The Australian Cancer Network *Clinical practice guidelines for the prevention, early detection and management of colorectal cancer* defines three categories of people in relation to risk for bowel cancer based on their family history of the disease.

- In the first category, people who have just one first-degree relative with bowel cancer are advised to have the same screening as those at average risk, provided their relative was diagnosed with cancer at or over the age of 55.
- The second category includes people with two or more first-degree relatives with bowel cancer (on the same side of the family) or one first-degree relative diagnosed under the age of 55 years. Because of their greater risk for cancer, screening is generally based on periodic (usually every five years) colonoscopy.
The third category covers members of families with definite or suspected FAP or HNPCC. People with FAP usually have hundreds of small polyps throughout their bowel, some of which become malignant if not removed. HNPCC is not associated with polyposis but, like FAP, is caused by an inherited change in a gene. The place of genetic testing and recommendations about surveillance and prophylactic surgery are described in chapter 7 of the guidelines (ACN Revision Committee 2005).

Detailed recommendations for surveillance by colonoscopy in those with past bowel cancer or adenoma are also set out in the Australian Cancer Network guidelines.

Culturally appropriate communication
Announcements made with the 2005/06 federal budget stated that Aboriginal and Torres Strait Islander communities will be invited to participate in the screening program from age 45. The pilot evaluation showed that culturally and linguistically diverse communities and Aboriginal people and Torres Strait Islanders lacked awareness of bowel cancer screening issues. This was a major barrier against participation (Woolcott Research 2004). Culturally appropriate education and resources, as well as engagement with local health workers, will be needed to address the particular needs of these communities (Woolcott Research 2004) and to ensure that their participation, or non-participation, is based on informed choice.

The role of general practice
General practitioners (GPs) have an important role at critical points in the National Bowel Cancer Screening Program (DHA 2006). These include:

- determining the appropriateness of screening for individual patients (e.g. those with significant co-morbidities, or those who’ve recently undergone screening outside the national program)
- assessing high-risk individuals and managing them according to National Health and Medical Research Council guidelines
- receiving FOBT results where the participant has nominated a GP
- managing participants with a positive FOBT
- notifying the central registry of outcomes.

GPs also have an important role in recognising and assessing individuals with symptoms that could be related to cancer, and in whom diagnostic investigations (rather than screening) are required (ACN Revision Committee 2005; McMurrick, Dorien & Shapiro 2006). Symptoms include:

- bleeding from the back passage or any sign of blood in a bowel motion
- an unexplained and persistent change in bowel actions
- unexplained tiredness
- lower abdominal pain
- a persistent feeling of fullness.

A recommendation from a GP has been shown to enhance participation rates in bowel cancer screening using FOBTs (Cole et al. 2002). It has been shown to be the most highly rated attribute that would encourage participation in bowel cancer screening (Salkeld et al. 2003). Over 90% of a population group surveyed responded that they would be likely or very likely to have an FOBT every two years if a doctor recommended this (Epidemiology Services Unit 2004). Pilot program invitees who did not participate indicated they were
likely to do so if reinvited, especially if recommended by a GP (DHA 2005). Given this, it is not unreasonable to expect that a proactive approach by GPs in identifying their eligible patients and recommending their involvement in the screening program, may enhance participation rates. Whilst there is evidence that GPs support bowel cancer screening, GPs have also articulated a need for further education about this activity (Turner et al. 2006; Tong et al. 2004).

It is anticipated that the national screening program will increase awareness of bowel cancer and bowel cancer screening in the broader population, including those not currently eligible for the screening program. GPs will be in a position to respond to this demand by managing patients according to current guidelines (RACGP 2005; ACN Revision Committee 2005).

Potential benefits and adverse effects of bowel cancer screening

Potential benefits
As discussed earlier, bowel cancer screening using FOBTs has the potential to significantly reduce mortality from bowel cancer. Monitoring systems in South Australia found that only 15% of bowel cancers are detected at the earliest point, Stage A (AHTAC 1997). Thus an important potential benefit of screening is to detect early stage, curable cancers in those without any clinical evidence of disease (ACN Revision Committee 2005). A screening program also has the potential to detect advanced adenomas, allowing them to be removed before progressing to bowel cancer.

Thus, the benefits of bowel cancer screening are two-fold: providing opportunities for both prevention and early detection. It is predicted that a fully implemented screening program could save close to 2000 lives per year (Macrae 2005).

Potential adverse effects
Bowel cancer screening may result in adverse psychological and physical effects due to false positive tests. The potential adverse effects include anxiety induced by fear of having bowel cancer, anxiety related to diagnosis of lesions of doubtful clinical significance and complications of invasive diagnostic procedures (specifically colonoscopy). In several studies, anxiety due to positive test results was shown to decrease after investigation of the cause, with no evidence of long-term harm after screening (Lindholm et al. 1997; Wardle et al. 1999; Parker et al. 2002). The need to provide timely follow-up investigations following a positive result from an FOBT has important implications for the national program, as delays in the provision of colonoscopy may lead to high levels of anxiety.

The most significant adverse effect is the potential for physical harm linked to exposure to colonoscopy. Colonoscopy is performed as a day case procedure and usually requires sedation. It can produce severe complications such as perforation, haemorrhage or death and carries a remote risk of transmitting infections. In a review of six prospective studies of colonoscopy, about one in 1000 patients suffered perforation, three in 1000 suffered major haemorrhage, and between one and three in 10,000 died as a result of the procedure (Winawer et al. 1997). In two more recent studies, the findings were similar, overall morbidity being 0.4% (Dafnis et al. 2001; Gatto et al. 2003). A review of a large Australian hospital experience supported the conclusions of these other studies and reported a mortality rate of 0.004% in outpatients having the procedure (Viala et al. 2003).
Despite the possibility of adverse consequences of screening, distress generated by diagnosis of an advanced cancer when there has been no opportunity for early detection by screening also needs to be taken into consideration (ACN Revision Committee 2005).

Who should be screened?

Randomised controlled trials at the population level indicate that screening tests for faecal occult blood reduce overall mortality from colorectal cancer in populations selected on the basis of age. These have shown benefit for people aged 45–50 years and upward. Cost-effectiveness studies also demonstrate that age influences cost-effectiveness. Together with the observation that risk increases four-fold between ages of 40 and 50 years, these lead to the recommendation that screening of average risk people should commence at age 50 years (NHMRC 2005).

Although the National Health and Medical Research Council guidelines do not suggest an upper age for screening, it is common for population-based screening programs to do so. There is no clear evidence on the best age to cease screening for bowel cancer. In the randomised controlled trials using FOBT, the upper age at the time of entry ranged from 75 (Kronborg et al. 1996) to 80 years (Mandel et al. 1993). With increasing age, bowel cancer becomes more prevalent, but the potential for years of life saved through screening decreases. In addition, follow up colonoscopies may be less well tolerated among the elderly and participation is likely to drop off after the age of 70 (Hardcastle et al. 1996). Further cost-effectiveness research is needed to establish an appropriate upper age for the National Bowel Cancer Screening Program.

Aims

The Cancer Council aims to maximise participation of eligible people in the bowel cancer screening program and contribute to developments in knowledge to improve that program.

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<th>What we want to achieve</th>
<th>How The Cancer Council Australia and its members (the state and territory cancer councils) will do this</th>
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| Increased awareness among the general public and key health professional groups of the links between bowel cancer and nutrition, physical activity, obesity, alcohol consumption and smoking cessation | Advocate for a whole-of-government approach incorporating social marketing, policy reform and research, administered through a partnership involving all jurisdictions and peak health bodies (the success of the integrated National Tobacco Campaign of the late 1990s provides an excellent example on which to draw)  
Ensure key messages are promoted to the public and relevant health professionals in publications, presentations, programs, media statements and where opportunities arise  
Promote and/or develop primary health resources, specifically for general practice, to improve evidence-based interventions by health professionals |
<p>| A high-quality, well resourced national bowel cancer screening program capable of reaching 70% two-yearly participation of people over 50 years of age by 2012 | Advocate for a whole-of-government agreement to a comprehensive, evidence-based screening program with adequate funding to reach the target population |</p>
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| A process of quality assurance and continuous improvement in the national bowel cancer screening program | Advocate for the development of mandatory national training and accreditation standards for colonoscopy provision  
Advocate for government to build a formal, ongoing evaluation mechanism into the program to ensure regular monitoring and periodic evaluation. Evaluation should address:  
• overall outcomes relating to the impact of the program on bowel cancer mortality and morbidity  
• economic outcomes relating to the cost-effectiveness of the program and barriers to optimising participation among the target population  
• process outcomes relating to the performance of the program against its stated objectives  
• potential barriers to evaluation, notably fast-tracking cancer registrations to facilitate timely evaluation of program outcomes  
• sufficient resources to enable stated objectives to be achieved  
• periodic review of the target screening age group  
Support professionals such as general practitioners to contribute to the program’s efficiency and effectiveness  
Advocate for increase government funding and service redevelopment initiatives to increase colonoscopy capacity and ensure wait times are minimised  
Advocate for government support, including adequate funding, to ensure targets for participation are met, while maintaining a focus on equity and access. Priority should be given to maximising the participation of Australian Aboriginal and Torres Strait Islander communities and people of culturally and linguistically diverse (CALD) backgrounds, as they are likely to be under-screened  
Support professionals such as general practitioners to contribute to the program’s efficiency and effectiveness  
Support professionals such as general practitioners to contribute to the program’s efficiency and effectiveness  
Recognising the importance of providing consistent high quality care for people diagnosed with bowel cancer in Australia:  
• support or advocate for examination of the extent to which people diagnosed in the screening program are being treated in accordance with the NHMRC Clinical practice guidelines for the prevention, early detection and management of colorectal cancer (2005)  
• encourage data collection that includes stage and outcome measures as well as qualitative information on patient experience |
| Sufficient workforce capacity to ensure colonoscopy wait times for a positive FOBT are under 30 days (for both screening program participants and those who have screened outside the program) | Advocate for the development of mandatory national training and accreditation standards for colonoscopy provision  
Advocate for government to build a formal, ongoing evaluation mechanism into the program to ensure regular monitoring and periodic evaluation. Evaluation should address:  
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• encourage data collection that includes stage and outcome measures as well as qualitative information on patient experience |
| Maximum participation of eligible people in bowel cancer screening                       | Advocate for the development of mandatory national training and accreditation standards for colonoscopy provision  
Advocate for government to build a formal, ongoing evaluation mechanism into the program to ensure regular monitoring and periodic evaluation. Evaluation should address:  
• overall outcomes relating to the impact of the program on bowel cancer mortality and morbidity  
• economic outcomes relating to the cost-effectiveness of the program and barriers to optimising participation among the target population  
• process outcomes relating to the performance of the program against its stated objectives  
• potential barriers to evaluation, notably fast-tracking cancer registrations to facilitate timely evaluation of program outcomes  
• sufficient resources to enable stated objectives to be achieved  
• periodic review of the target screening age group  
Support professionals such as general practitioners to contribute to the program’s efficiency and effectiveness  
Advocate for increase government funding and service redevelopment initiatives to increase colonoscopy capacity and ensure wait times are minimised  
Advocate for government support, including adequate funding, to ensure targets for participation are met, while maintaining a focus on equity and access. Priority should be given to maximising the participation of Australian Aboriginal and Torres Strait Islander communities and people of culturally and linguistically diverse (CALD) backgrounds, as they are likely to be under-screened  
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• encourage data collection that includes stage and outcome measures as well as qualitative information on patient experience |
| Referral to appropriate treatment services and collection of information about the outcome of treatment | Advocate for the development of mandatory national training and accreditation standards for colonoscopy provision  
Advocate for government to build a formal, ongoing evaluation mechanism into the program to ensure regular monitoring and periodic evaluation. Evaluation should address:  
• overall outcomes relating to the impact of the program on bowel cancer mortality and morbidity  
• economic outcomes relating to the cost-effectiveness of the program and barriers to optimising participation among the target population  
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Section Two: Screening to detect cancer early

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**Bowel (colorectal) cancer**


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Currently there is no conclusive scientific evidence that population screening for melanoma reduces mortality from this disease.

Melanoma in Australia

Australia has the highest incidence of melanoma in the world. In 2005, an estimated 10,014 Australians (5705 men and 4309 women) were diagnosed with melanoma. Excluding non-melanoma skin cancer, melanoma was the third most common cancer diagnosed in Australian women (after breast and colorectal cancer), and the third most common in Australian men (after prostate and colorectal cancer) in 2005. In 2005 there were 862 deaths from melanoma in men and 411 in women (ABS 2007).

Can melanoma be prevented?

Melanoma is potentially almost totally preventable. Exposure to excess ultraviolet (UV) radiation is the major environmental factor in its development and one which is amenable to behavioural intervention. More information on prevention of melanoma is included in the chapter on ultraviolet radiation.

Screening tests for melanoma

The screening tests proposed for early detection of melanoma include total body skin examination by a health care professional or skin self-examination. Detection of a suspicious lesion constitutes a positive screening test for which further investigation is required. Melanoma is confirmed by skin biopsy (ACN & NHMRC 1999).

Skin examination by a GP or specialist

Although differences have been reported between the effectiveness of specialists and GPs in detecting malignant melanoma (Morrison, O’Loughlin & Powell 2001), a systematic review concluded that there was insufficient evidence to prove an overall difference (Chen et al. 2001). Nevertheless, a number of studies have indicated that the benign-to-malignant ratio of pigmented skin lesions is very high (around 30:1) in the general practice setting in Australia (Del Mar et al. 1994; Marks et al. 1997).

The ability of GPs to conduct screening for melanoma is an important pre-condition for the introduction of a screening program, but little information is available on this. In a large trial of population screening in Queensland using whole-body skin examinations, 2.5% of all suspicious skin lesions detected by GPs were confirmed as melanoma giving an estimated specificity of 86.1% (Aitken et al. 2006). The melanomas detected during that screening program tended to be less advanced, similar to results found in other screening programs (Geller et al. 2003).

Another factor to be considered in screening for melanoma is the proportion of the body examined. Melanoma is more likely than non-melanoma skin cancers to appear on
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sites of the body not normally exposed to the sun. One study estimated that detection of melanomas was six times more likely with a total body skin examination (Rigel et al. 1986), but a smaller subsequent study found little advantage in total body examination (De Rooij et al. 1996). While screening of visible areas of the body has been demonstrated to be well accepted (Girgis et al. 1996), a total body skin examination raises the issue of embarrassment as a barrier to repeated screening. However, a recent study found that only 8% of participants said that they agreed or strongly agreed that having a skin examination would be embarrassing (Janda et al. 2004).

A critical issue in regards to screening by GPs or specialists is to determine the significance of including relatively new diagnostic techniques in the screening process. Dermoscopy (surface microscopy) is a well-researched technique that uses inexpensive hand-held surface microscopes allowing a significant increased melanoma diagnostic ability in a specialist setting (Kittler et al. 2002). It has also been shown to improve the sensitivity for melanoma diagnosis by 38% in a study using Australian GPs (Westerhoff, McCarthy & Menzies 2000). There have been a number of computer programs developed to analyse digitalised dermoscopy images. These have been widely promoted by the manufacturers for use in the general community. However, they are still in the research and development phase and there are no data as yet to show they are superior to a well-trained and experienced clinician using dermoscopy. Trials using dermoscopy and hand-held digital monitoring devices within general practice are currently underway in Western Australia. Further research is required to determine their value in community screening for melanoma.

Self-examination

Studies have shown a tendency by subjects to under-report or demonstrate poor self-assessment of pigmented skin lesions (Borland, Marks & Noy 1992; Hanrahan et al. 1995), which may have significant ramifications for self-referral to screening (Eiser et al. 2000; Melia et al. 2000). Most studies examining detection of melanoma have found that the majority of melanomas are first detected by the patient (Koh et al. 1992; McPherson et al. 2006). However, in one of these studies only about 4% of patients who detected the melanoma themselves did so during a deliberate skin self-examination (McPherson et al. 2006).

Rationale for screening for melanoma

Interest in screening for melanoma is based on the potential for detection and treatment of significantly thinner melanomas, since people in whom thinner melanomas are detected and excised experience a better outcome than those detected with more advanced disease.

For non-melanoma skin cancer, early detection of squamous cell carcinoma can also reduce the rate of deaths if treated early, while for basal cell carcinomas for which the rates of death are much lower, the benefits of screening would relate to reductions in illness, costs and inconvenience (NHMRC 1997).

This discussion will focus on screening in relation to melanoma.
Would screening be of benefit at this stage?

Despite no formalised screening program in Australia, mortality from melanoma in younger cohorts is improving. This may reflect either earlier presentation of tumours or increased detection of clinically irrelevant indolent melanomas (AIHW & AACR 2004).

Existing community awareness is leading to successful screening and early detection both at the request of individuals and opportunistically from their health care providers. To reduce mortality further, an organised screening program would need to significantly enhance early diagnosis beyond what is currently being achieved.

An additional concern relates to rapidly growing melanoma. A recent study suggests that one-third of melanomas grow rapidly (at 0.5 mm or more of tumour thickness per month) (Liu et al 2006). These are unlikely to be detected early at an annual screening program. Evidence is insufficient at present to recommend for or against routine screening for melanoma of the general asymptomatic population. This is consistent with the current position of the US Preventive Services Task Force (AHRQ 2005).

Aims

The Cancer Council’s aims are to:

• encourage research to determine the impact of new diagnostic technologies (dermoscopy and digital monitoring) in general practice
• encourage further research to determine whether screening for melanoma in Australia would reduce illness and death and whether implementation would be practical and acceptable to the community.

References

Melanoma


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Section Two: Screening to detect cancer early
Cancer of the prostate is a common and important health problem. Its early diagnosis and subsequent treatment present a dilemma for medical practitioners and consumers. Since advantages of testing and treatment are not clear-cut, individual men who decide to be tested for prostate cancer should be able to do so on the basis of informed consent, having access to full information about the potential benefits and risks associated with testing. Preliminary findings suggest that introduction of a national education program for general practitioners to improve decision-making relating to the use of prostate-specific antigen testing would be cost-effective.

Prostate cancer in Australia

In 2005, prostate cancer is projected to be the most common cancer (apart from non-melanoma skin cancer) diagnosed in Australian men, with an estimated 12,529 new cases (AIHW, AACR, NCSG & McDermid 2005).

Prostate cancer mainly affects men in older age groups. Over 85% of new cases and over 96% of deaths occur in men over 60 years of age. It is rare in men under 45 years.

Although the incidence of prostate cancer increases with age, the threat to life from prostate cancer decreases with age because the disease generally develops and progresses slowly. This means that men diagnosed with prostate cancer who are older than 75 years or have fewer than 10 years life expectancy are considered to be least at risk of dying of prostate cancer.

Men who are diagnosed at an earlier age (e.g. in their 50s) are most at risk of dying from prostate cancer (Baade, Steginga et al. 2005). This is because it is probable that they will live long enough for their prostate cancer to progress to a life-threatening stage and are less likely to die from competing causes. It is also important to note that, irrespective of the risk it poses, a diagnosis of prostate cancer at any age can have a major impact on a man’s quality of life.

The incidence of prostate cancer was relatively stable until 1989 but, between 1990 and 1994, there was a dramatic rise in the number of new cases reported (AIHW & AACR 2004). This has been attributed to increased detection of the disease due to many more investigations, particularly case-finding using PSA testing, which was introduced around 1990 (see below). However, between 1994 and 1997 the age-standardised prostate cancer incidence rate fell by 30%. Since then, there has been little change between the 1998 and 2005 rate, indicating that the surge-effect from the previously undetected cases has been accommodated and the practice of early detection has stabilised.
The mortality rate from prostate cancer, which is significantly lower than the incidence rate, decreased by 1.9% per annum between 1991 and 2005, when 2,946 deaths were reported (ABS 2007).

The burden of prostate cancer is likely to increase with the ageing of the Australian population, and this has major public health and economic implications (Weller et al. 1998).

Can prostate cancer be prevented?

The causes of prostate cancer are poorly understood. Geographical and racial differences in rates of prostate cancer provide compelling evidence that environmental and lifestyle factors are involved (Weller et al. 1998). Age and family history are the strongest risk factors in Australia. Researchers continue to examine other possible risk factors, including diet, weight and physical activity. An effective approach to primary prevention of prostate cancer has not yet been identified (Harris & Lohr 2002).

Chemoprevention is being investigated but is not in routine use. A trial examining selenium and vitamin E (The SELECT trial) is in progress, with results not anticipated until 2013 (Klein 2004). An analysis of the screening arm of the prostate, lung, colorectal and ovarian (PLCO) cancer trial does not show a benefit for supplementation with the micronutrient antioxidants vitamin E, beta-carotene and vitamin C (Kirsh et al. 2006).

An Australian review noted that there is little evidence that could define risk groups sufficiently for targeted screening activities (Weller et al. 1998). One possible exception is men with a strong family history of prostate cancer. Men with a first-degree relative diagnosed with prostate cancer have a two-and-a-half times greater risk of being diagnosed, with some evidence that the risk is higher if the relative was diagnosed before the age of 60 years (Johns & Houlston 2003). The genetic basis has not been identified, though men carrying mutations of the breast cancer susceptibility genes BRCA1 or BRCA2 gene have an increased risk of several types of cancer, including prostate cancer (Liede et al. 2000). The questions of whether, when and how often such people should be monitored have yet to be addressed.

Tests for prostate cancer

Prostate-specific antigen test

The prostate-specific antigen (PSA) test is commonly used to try to detect prostate cancer. It measures the amount of PSA in blood.

PSA levels can be raised due to a range of conditions. In studies of men aged 45 to 80 years, 7% to 13% had a PSA level greater than 4 ng/ml; of these, 10% to 30% were identified as having prostate cancer on biopsy (USPSTF 2005). The level of PSA used to justify biopsy is commonly set at 4 ng/ml. Some have advocated a cut-off of 2.5 ng/ml (Punglia et al. 2003), since it is estimated that 25% to 30% of prostate cancers are detected with a PSA between 2.5 and 4 ng/ml (Pepe et al. 2006). However, increased sensitivity by use of a lower level will decrease specificity, leading to a higher rate of unnecessary biopsies and an increase in over-diagnosis (see below).

Accuracy may be improved by taking into account a man’s age, since PSA levels increase with age due to benign enlargement of the prostate. It may also be improved by measuring the proportion of free to total or complexed PSA, since men with prostate cancer tend to
have lower levels of free PSA than men who don’t have prostate cancer. However, there is no consensus yet on either of these measurements (Harris & Lohr 2002; Stenman 1997).

**Digital rectal examination**
Another form of testing is digital rectal examination. This test involves manual examination of the prostate gland through the rectum. Some abnormalities may be felt but it is not possible to feel all of the prostate. A cancer that is in a part of the prostate gland out of the doctor’s reach—estimated to be 25% to 35% of the prostate—may be missed (USPSTF 2005). In addition, small (stage A or T1) cancers cannot be felt. Wide variations in reporting occur between doctors (AHTAC 1996).

**Transrectal ultrasound and biopsy**
Neither the PSA test nor DRE, alone or together, is a truly accurate test for prostate cancer. If abnormalities are detected by a PSA test or DRE, tissue specimens will be needed for diagnosis, usually via transrectal ultrasound (TRUS) imaging to permit spatial positioning of biopsy needles. The needle biopsy procedure involves eight to 10 or more cores of tissue being removed for examination under a microscope. Even though tissue is taken from a number of locations, and most malignant cancers will be detected, it is not possible to say with complete certainty that a negative result excludes the presence of cancer. The test carries risks of infection and bleeding (AHTAC 1996).

**Test limitations and implications**
The sensitivity and specificity of the screening tests available for prostate cancer cannot be determined with certainty (i.e. confirmed by pathology tests on tissue samples) because biopsies are generally not done on people with negative screening tests (USPSTF 2005). Only the positive predictive value—the probability of cancer when the test is positive—can be calculated with any confidence, but this also is subject to methodological difficulties from the needle biopsy (USPSTF 2005).

A recent study where 2950 men with ‘normal’ PSA values (<4 ng/ml) were subjected to biopsy found that 15% had prostate cancer on biopsy (Thompson et al. 2004).

There is no single test or combination of techniques that can detect prostate cancer and predict which cancers, if left untreated, are likely to:

- result in few, if any symptoms, require no treatment and have no effect on life expectancy
- progress to a stage of widespread and aggressive cancer.

Recent research has focused on the PSA test, particularly to improve its sensitivity and specificity. Various derived measures, including free-to-total PSA ratio, PSA density and age-specific ranges, have been suggested (Bangma et al. 1995) but have not become established as superior to total PSA (Ciato et al. 2001). The question remains whether measurement of PSA provides benefits to patients in terms of treatment and quality of life outcomes. Studies so far have been subject to methodological difficulties.

Randomised controlled trials of screening for prostate cancer are underway (European Randomized Study of Screening for Prostate Cancer: ERSPC), Canada and the US (PLCO cancer screening trial), but results in terms of differences in death rates are not expected to be available until about 2008 (Schroder et al. 1999).

These uncertainties over the specificity and sensitivity of the PSA test are important ingredients in a discussion balancing the potential good and harm resulting from the test.
Participants in the ERSPC trial completed a questionnaire on health before screening and then twice subsequently if they were diagnosed with prostate cancer. Mental and self-rated overall health worsened significantly immediately after diagnosis (P <or=0.04), but months later no longer differed significantly from the pre-diagnosis score (Korfage et al. 2006). If radical treatment results from screening with PSA, the complications of treatment—including possible impotence (up to 79.3% at five years) and severe urinary incontinence (15.4% in one population-based longitudinal cohort of 901 men)—need to also be balanced against the outcomes if the PSA test had not been performed (Potosky et al. 2004).

Future prospects for screening tests
Other candidate biomarkers are being investigated, including novel tests for human kallikrein 11 from seminal plasma (Luo et al. 2006). Genetic tests are also being investigated.

Who has been tested?
There is widespread community concern about prostate cancer, reflected in the high rates of PSA testing in general practice. In a South Australian study, 20% of men aged 40 and over reported having a PSA test in the preceding 12 months (Pinnock, Weller & Marshall 1998), while in a NSW study, 22% men over 55 years had undergone testing in the same period (Ward et al. 1997). A national study reported that 27% of Australian men 50 years and over had had at least one test in 1995–96 (Smith & Armstrong 1998). The age-standardised rates of PSA testing were lower in rural than urban areas by 16% in 2002–03 (Coory & Baade 2005).

It is important that men understand what decisions they will face if a PSA test is abnormal. Certainly men regard undisclosed screening as inappropriate and favour education about screening so they can make informed choices (Gattellari & Ward 2005).

The policy context
Population screening for prostate cancer, as opposed to individuals deciding to have a PSA test, is widely debated. All screening programs cause some harm. This could include false alarms, inducing anxiety, and the treatment of early disease that would not otherwise have become a problem.

The Cancer Council supports expert reviews (AHTAC 1996; Selley et al. 1997; Weller et al. 1998; Harris & Lohr 2002) that current evidence does not support population screening of well men for prostate cancer.

Recommendations of the Australian Health Technology Advisory Committee report (1996) included that:

- men being offered or requesting the PSA test be fully informed of the limitations of the available tests and the possible further diagnostic and treatment choices they may face if they have the test
- research into prostate cancer continues to be targeted as a high priority funding area by the National Health and Medical Research Council and other funding bodies
- a mechanism be established to ensure that new technologies for screening, diagnosis and treatment of prostate cancer are rigorously trialled before being introduced into routine clinical practice, or, alternatively, that they are introduced under trial conditions involving appropriate professional bodies
• a monitoring mechanism be put in place to ensure that the Australian Health Technology Advisory Committee position on screening is reviewed when significant developments occur

• a comprehensive education program on the risks and benefits of prostate cancer testing be introduced for GPs, their patients and the community.

The Cancer Council Australia and state and territory cancer councils were active in the establishment in 1998 of the National Prostate Cancer Collaboration to foster clinical, laboratory and epidemiological research, as well as research and programs in education. In 1999 the group became the Australian Prostate Cancer Collaboration. Its aim is to develop strategies for the control of prostate cancer to decrease mortality and increase quality of life.

The role of general practice

Recent reports suggest that GPs are poorly resourced to assist their patients making an informed choice on prostate cancer testing. Only half or less of the GPs who responded to a survey were aware of guidelines published by the Royal Australasian College of General Practitioners and The Cancer Council Australia—both of which recommend against population screening (Ward, Young & Sladden 1998).

A meeting about informed choice for prostate cancer testing in general practice (Pinnock 2004) reported that:

• studies on how patients make medical decisions indicate that non-systematic factors such as old beliefs, anecdotes and salient experiences are more common than a systematic weighing up of pros and cons (see also Farrell, Murphy & Schneider 2002; Steginga et al. 2002)

• testing is often requested for medico-legal reasons. The process and content of an informed choice discussion needs to reflect medico-legal obligations

• criteria have been developed to assess which decision aids are likely to be most effective in helping patients become informed and make decisions

• the barriers GPs face in fully informing patients with diverse backgrounds and knowledge need to be better understood

• particular skills are needed in order to communicate complex issues such as uncertainty and risk to patients

• complicating factors are men’s lack of access to primary care services, particularly in rural areas, poor general knowledge of male health in the community and high prevalence of anxiety about urinary symptoms.

Preliminary findings suggest that the introduction of a national education program for GPs to improve decision-making relating to the use of PSA testing would be cost effective (Stone et al. 2005). Evaluations of the GP education workshops have shown that as participants’ knowledge about PSA testing and level of understanding increased, they were more likely to initiate discussions with patients about the risks and benefits of testing, and they were more confident in doing so (Metcalfe et al. 2006; Steginga et al. 2005).
Potential benefits and adverse effects of prostate cancer screening

Refer to the introduction to Section Two for the World Health Organization criteria that need to be satisfied before population screening for a disease may be introduced. Central to this is the need for evidence that screening for the disease, with subsequent early treatment, is effective in improving health outcomes. In relation to prostate cancer, the question is whether detection of tumours using currently available tests will result in benefits for most patients.

The difficulty regarding early detection of prostate cancer is that first, depending on the age of the patient, many cancers found through screening will not be life threatening. Second, it is currently not possible to distinguish with certainty those cancers that will be life threatening. It has been estimated that prostate cancer is present in 30% to 40% of men aged more than 50 years, but only one in four of these cancers will result in clinical symptoms and one in 14 will cause death (Weller et al. 1998).

Would population screening be of benefit at this stage?
The current state of knowledge does not satisfy the World Health Organization criterion that there should be an accepted treatment for patients with recognised disease. It is possible that intervention through early detection will cause more harm than good, for example in the risks posed by treatment (see below).

The problem of over-diagnosis
A major concern with screening is that it will diagnose cancers which, if left undetected, would never have caused morbidity or mortality. This is known as over-diagnosis. One estimate using mathematical modelling puts the over-diagnosis rate as high as 50% (Draisma et al. 2003). It has been estimated that most prostate cancer detected by commonly promoted testing strategies would not have caused morbidity or mortality (McGregor et al. 1998; Draisma et al. 2003). Over-diagnosis results in unnecessary treatment with high risks of urinary incontinence, bowel problems (especially following radiation) and erectile dysfunction (Begg et al. 2002).

Prostate cancer treatment issues
The major treatment options following detection of prostate cancer are active treatment (surgical removal of the prostate or radiation therapy) or observational treatment (watchful waiting) (AHTAC 1996).

Our knowledge of which prostate cancers are life threatening and which are not is limited. In the European Randomised study of screening for prostate cancer, the patients in the Rotterdam section were screened by PSA, DRE and transrectal ultrasound. A subset of patients who would have qualified for a surveillance program were identified: those with a Gleason score less than or equal to 3+3, PSA density less than 0.2 and a maximum PSA level of 15 ng/ml. Those who met the above arbitrary criteria who chose watchful waiting did not do worse than those who had active treatment at a mean follow-up to 80.8 months (Roemeling et al. 2006).

Limitations of studies comparing the effectiveness of treatments occur because most information on treatment by surgical removal of the prostate comes from uncontrolled case series and cohort studies that indicate survival following surgery is high. However,
because surgical patients are usually younger and have less advanced disease, it is difficult
to separate out the effects of treatment efficacy and selection bias.

In practice there is a wide variation in treatment decisions. Treatments for early prostate
cancer differ in the proportion of patients who are likely to experience side effects such as
erectile problems, incontinence and bowel symptoms.

Current clinical practice supports active intervention, particularly among men whose life
expectancy exceeds 10 years with aggressive and early onset of disease.

Randomised controlled trials comparing options are difficult to conduct, but a recent study
compared watchful waiting with immediate radical prostatectomy in 695 men with newly
diagnosed early stage prostate cancer. Prostatectomy led to a significant reduction in
both metastatic disease and disease-specific mortality, and, after eight to 10 years, overall
mortality (Holmberg et al. 2002; Bill-Axelson et al. 2005).

Radiation therapy is widely practised in Australia, particularly among older patients and
those with more aggressive or later stage (high-risk) cancers. Newer techniques, delivering
radiation therapy aimed at increasing the radiation dose while minimising effects on
adjacent tissues, are becoming increasingly available. An analysis of 60,290 men with low
and moderate grade organ-confined prostate cancer, on the National Cancer Institute’s
Surveillance, Epidemiology and End Results (SEER) Program showed better survival for
men under and over 60 years if they received surgery or brachytherapy rather no definitive
treatment (Tward et al 2006).

Because it has not been possible to prove definitively that treatments differ in effectiveness
(NHMRC 2003), the incorporation of patient preference into treatment decisions is widely
endorsed (Weller et al. 1998; NHMRC & ACN 2003).

Aims

The Cancer Council Australia supports:

- advocating for and contributing expert advice to the development of decision-making
tools for informed choice about prostate cancer testing, for medical practitioners and
consumers, based on the best available evidence
- contributing to the development and implementation of community education relating
to the prostate and prostate cancer
- monitoring and supporting research on population screening and testing for prostate
cancer to inform the development of policy and communication strategies
- seeking opportunities to work with health related agencies, health professionals and
consumers to increase understanding of the prostate and prostate cancer
- addressing the issues which cause inequities in access and outcomes in prostate
cancer, such as living in rural and remote Australia, by developing models where
information and multidisciplinary care can be accessed by those groups.
Section Two: Screening to detect cancer early

References

Prostate cancer


National Health and Medical Research Council (NHMRC) & Australian Cancer Network (ACN) 2003. *Clinical practice guidelines: evidence–based information and recommendations for the management of localised prostate cancer*. Canberra: NHMRC.


Section Two: Screening to detect cancer early


Section Three:
Immunisation

www.cancer.org.au
Human papilloma virus

This chapter will be available online from mid-2007 at www.cancer.org.au.
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