Chapter 2

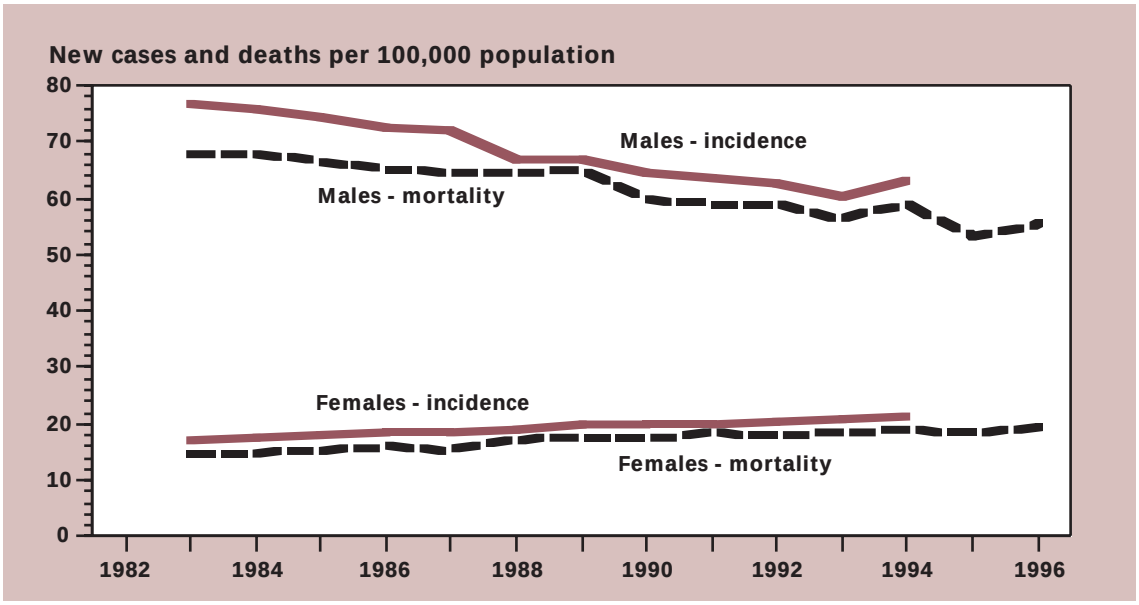
National Health Priority Areas cancer sites — current status

2.1 Lung cancer

Epidemiology

Cancer of the lung is the most common cause of cancer death among males and the fourth most common cancer in Australia. Lung cancer incidence and mortality rates in males exceed those in females by approximately three to one and increase with age.

Figure 2.1 Lung cancer — incidence and mortality trends



Since the early 1980s, there has been a steady decline in male lung cancer incidence by approximately 18 per cent, while female lung cancer increased by approximately 23 per cent (Figure 2.1). Projections of incidence data indicate that the rate of lung cancer in males will continue to fall to 58.6 per 100,000 (approximately 5,400 new cases) in 1999. Among females, the current rate of increase is projected to continue to a rate of 22.8 per 100,000 (approximately 2,600 new cases) in 1999. In 1994, there were 5,196 new cases diagnosed in males and 2,110 cases in females, accounting for 12.2 per cent of all new cancers in males and 6.4 per cent in females.

In 1996, lung cancer was the cause of 4,773 male deaths and 2,054 female deaths. Mortality from this cancer results in approximately 46,500 potential years of life lost before the age of 74 (Table 2.1), making it the most significant cancer in Australia based on this measure. Five-year survival rates are poor, at around 10 per cent for both males and females.

Table 2.1 Fast facts on lung cancer

Australia	Males	Females
New cases (1994)	5,196	2,110
Incidence rate (per 100,000)	63.1	21.1
Incidence trends (1990-94)	-0.6%pa	+1.2%pa
% all new cancers	12.2	6.4
Lifetime risk (0-74 years)	1 in 19	1 in 51
Deaths (1996)	4,773	2,054
Mortality rate (per 100,000)	55.4	19.4
Mortality trends (1990-96)	-1.3%pa	+2.0%pa
Potential years of life lost (0-74 years)	31,343	15,120
Lifetime risk (0-74 years)	1 in 22	1 in 59
Costs ($ '000) (1993-94)	71,146	31,685

Table 2.2 States and Territories — lung cancer

	1991–94 Incidence		1991–94 Mortality	
State/Territory	Males	Females	Males	Females
	New cases and deaths per 100,000 population			
NSW	63.7	21.2	56.5	18.2
VIC	63.7	21.8	58.0	19.8
QLD	63.5*	19.3*	56.8	16.9
WA	65.3	24.1	57.5	20.0
SA	64.8	20.8	55.9	17.1
TAS	68.7	22.9	59.3	20.9
ACT	51.2	22.8	46.9	18.0
NT	66.9	41.5	84.8	37.7

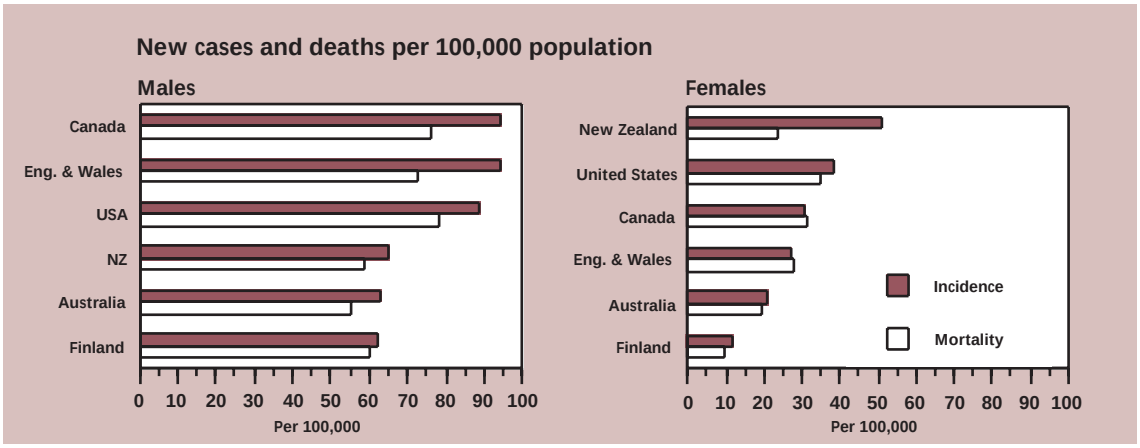
* Preliminary data.

There is limited variability in lung cancer incidence and mortality rates within Australia, except in the Australian Capital Territory where both the rates for males are much lower (Table 2.2). Incidence rates in the Northern Territory are higher for both males and females, but are subject to wide variability due to the relatively small size of the population.

National incidence and mortality data are not available for Indigenous Australians, however, data from the Northern Territory indicate that the incidence of lung cancer is higher in Indigenous Australians than non-Indigenous Australians.

In comparison with other major developed countries, Australia has lower lung cancer incidence and mortality rates for both males and females (Figure 2.2).

Figure 2.2 International comparisons — lung cancer



Note: Age-standardised rates for Australia (incidence–1994; mortality–1996) and other selected countries (incidence–1983–95; mortality–1993–94).

In Australia, males and females born in the UK, males born in Northern Europe and Malta and females born in New Zealand, Hungary, China, South Africa and the United States, appear to have significantly higher age-standardised mortality rates for lung cancer than the Australian born population (Giles et al 1995).

Risk factors

Smoking tobacco strongly increases the risk of lung cancer and accounts for approximately 85 per cent of new cases. This risk is associated with the cumulative exposure to tobacco smoke. Lung cancer risk rises with age. Risk factors also include exposure to other carcinogenic particulates.

Prevention

Prevention is the key to reducing the burden of lung cancer, as tobacco smoking is by far its largest preventable cause. The risk is associated with both the years of use and the amount smoked. There are no identified safe levels of tobacco consumption.

Rates of smoking in Australia

Smoking rates among adults have declined since the early 1980s. The most recent estimates suggest that there are 3.2 million adult smokers in Australia (28 per cent of males and 22 per cent of females) (DHFS 1995). The highest prevalence of smoking (31.2 per cent) is among those aged 18–34 years (ABS 1997).

Young people are a priority population for lung cancer prevention. Australian studies have demonstrated that by 14–16 years of age, 15 per cent of adolescents are smoking each day, and that in the last three years of secondary school, the prevalence of daily smoking increases from 15 per cent to 31 per cent (Stanton et al 1996). The earlier a smoker takes up the habit, and the longer their exposure to tobacco, the more likely it is that they will develop lung cancer or one of the other known smoking-caused diseases.

Smoking rates remain higher in less advantaged socio-economic groups. Adults classified as 'blue collar workers' have approximately twice the smoking prevalence rates of those classified as 'white collar workers' (Hill et al 1991). Of university graduates, 18 per cent of males and 14 per cent of females smoke, compared with 34 per cent of males and 25 per cent of females who attained an educational level of Year 9 or less (Hill et al 1991). The percentage of Indigenous persons who smoke is about twice the national average, being 56 per cent among males and 48 per cent among females (ABS & AIHW 1997). Smoking rates are also high among males born in Vietnam, Greece and the Middle East (AIHW, unpublished data).

Reducing tobacco caused harm

All Australian governments are committed to a comprehensive approach to reduce the harm caused by use of tobacco. This commitment is reflected in the National Health Policy on Tobacco, which was endorsed by the Ministerial Council on Drug Strategy in 1991. The National Health Policy recommends a multivariate approach to tobacco control incorporating advertising bans, education campaigns, restrictions on supply of tobacco products and enforcement of legislation (such as the NSW Sales to Minors Program) as essential strategies.

A recent example of a collaborative national effort to address the issue is the National Tobacco Campaign using the theme 'Every Cigarette is Doing You Damage'. The campaign, launched by the Commonwealth Minister for Health and Family Services in June 1997, is the first truly national anti-smoking campaign undertaken in Australia. The planning for the campaign involved extensive consultations with State and Territory Governments, *Quit* organisations across the country, the anti-smoking lobby and health professionals including the Australian Medical Association, the Royal Australasian College of General Practitioners, the National Heart Foundation and the Australian Cancer Society.

Quit campaigns in most States have helped to highlight the risks of smoking, as well as providing advice on cessation and promoting reduced uptake. Cessation is the most effective method of reducing the risk of lung cancer in smokers. Estimates suggest that 48 per cent of smokers in Victoria attempt to quit in any one year. Five per cent of smokers are able to quit for more than three months, 6 per cent for less than three months, and 37 per cent relapse (Silagy et al 1996).

The use of nicotine replacement therapy (NRT) significantly increases the chance of smokers abstaining long term. A meta-analysis of trials investigating the effects of NRT reveals a success rate of 18 per cent compared with 10 per cent in a control group (Silagy et al 1996). Behavioural modification and relapse prevention have also been shown to improve the likelihood of abstinence (Baillie et al 1994; Law & Tang 1995).

Risk of passive smoking

A recent report on passive smoking (NHMRC 1997) summarises the available evidence linking passive smoking with disease. Important associations are noted between passive smoking and several serious illnesses including asthma in children, lower respiratory infections, lung cancer, major coronary conditions and other diseases.

Measures to reduce tobacco smoking in public and work environments are likely to significantly reduce the risk to non-smokers. Strategies are also required to reduce the effect of passive smoking in the home environment.

Smoking prevention and cessation strategies

A major focus in smoking prevention has been on restricting the promotion of tobacco products, including bans on all but the most limited forms of tobacco advertising and a national system of strengthened health warnings on tobacco products.

The promotion of smoke-free policies which ban smoking in all workplaces and enclosed public places has had a significant impact. There is consistent evidence from studies in Australia, Europe and North America that the adoption of smoke-free policies in workplaces is followed by a net reduction in the number of cigarettes smoked daily among those who continue to smoke (Chapman et al, in press). Given adequate information and notice, compliance with smoke-free policies has been extremely high (Borland et al 1990; Wakefield et al 1996). Surveys show widespread support for extension of smoke-free policies, including in the hospitality industry (Schofield et al 1993; Jones et al, in press). While workplace smoking bans are becoming more common, small workplaces have the poorest rates of uptake of these policies (Wakefield et al 1996).

Screening and early detection

Reliable methods for early detection of lung cancer are yet to be developed. If such methods were developed, an effective screening and early detection program would be expected to have a major impact on lung cancer mortality in Australia because:

- currently, less than 30 per cent of patients are suitable for potentially curative treatment at presentation; and
- lung cancer rates are likely to remain at epidemic levels for at least the next 30 years. This is because the prevalence of smoking in Australian adults remains high, and because ex-smokers have an elevated risk of developing lung cancer, even if they have not smoked for many years (Lung Cancer Consultative Group 1997).

There is increasing evidence to support case detection strategies using serial chest X-rays and possibly sputum cytology in selected groups of high-risk smokers. These strategies are currently being advocated and practised by a number of Australian specialists (Lung Cancer Consultative Group 1997; McCaughan 1996).

Several new detection techniques are being developed for screening. Recent studies investigating the benefit of gene therapy and use of molecular markers for early diagnosis have shown promising results (Mao et al 1994; Sidransky 1995).

Treatment

Accurate staging of lung cancer is essential to determine optimal therapy. In particular the therapeutic modalities vary with the type of lung cancer. Lung cancer can be divided into two categories — non-small-cell lung cancer (NSCLC) and small-cell lung cancer (SCLC) and are treated differently. SCLC comprises 20 per cent of all lung cancer cases with the remaining 80 per cent of lung cancers, including adeno-carcinoma, squamous cell carcinoma and large-cell undifferentiated carcinoma, being classified as NSCLC (American Society of Clinical Oncology 1997).

Surgery has a proven survival advantage in early stage lung cancer, provided the tumour is completely resected (Lung Cancer Consultative Group 1997). Patients with peripheral tumours extending beyond the lung into adjacent structures also benefit from surgery. There is a limited role for surgical resection in highly selected patients with more advanced disease. Recent randomised data indicate a survival advantage in those patients given induction chemotherapy who subsequently undergo complete surgical resection of their tumour (Roth et al 1994). There is growing interest in the use of induction therapy (pre-operative chemotherapy alone or in conjunction with radiotherapy) in patients with advanced disease, followed by surgery or radiation therapy (Lung Cancer Consultative Group 1997; Flehinger et al 1993).

Radiotherapy and chemotherapy are used principally for palliative treatment of lung cancer, although high-dose radiation therapy provides a survival advantage in patients with early stage disease who are unsuitable for surgery or after incomplete resection (Lung Cancer Consultative Group 1997).

Developments are likely to include:

- improving the detection rate of potentially resectable primary lung cancer;
- assessing the role of chemotherapy and radiation therapy, used concurrently or sequentially, as induction therapy before surgery in locally advanced NSCLC; and
- evaluating the use of molecular markers in early screening and prognosis prediction.

Non-small-cell lung cancer

Of patients with NSCLC, 60–70 per cent present with advanced disease and are therefore not suitable for curative treatment (Lung Cancer Consultative Group 1997). In these patients, effective palliation is the principal aim of therapy. Of those undergoing curative treatment, a cure is achieved in about 50 per cent of patients (Lung Cancer Consultative Group 1997).

Small-cell lung cancer

Management of advanced SCLC has traditionally been with chemotherapy. However, radiation may be used for specific metastatic sites that are symptomatic, such as bone or brain metastases. Early data has shown that prophylactic cranial irradiation following chemotherapy in SCLC may confer a survival advantage but this area remains controversial (Turrisi 1997).

Combined modality therapy, concurrent radiation and chemotherapy, is the current standard treatment for limited non-bulky disease and results in rapid response and moderate toxicity (Turrisi 1997). Sequential therapy of initial chemotherapy followed by consolidating radiation therapy is reserved for patients with bulky disease. Molecular abnormalities may precede the occurrence of malignancy and may have diagnostic and prognostic value in SCLC (Mills et al 1995).

Developments in treatment are likely to include:

- evaluation of the mechanisms of resistance to chemotherapy and radiation therapy and methods to overcome these;
- evaluation of genetic markers of prognosis in SCLC; and
- evaluation of new chemotherapeutic regimes and molecular therapy for use in SCLC.

Lung cancer — current status

- **Lung cancer remains the leading cause of death in Australian males. Lung cancer rates in males exceed those in females by approximately three to one. Incidence and mortality rates in men are decreasing while those in women are increasing. Survival rates are very poor.**
- **Prevention is the key to reducing the burden of lung cancer, as smoking is by far its largest preventable cause. Action to reduce lung cancer rates has focused on promoting cessation and decreasing uptake of smoking, and on legislative changes to restrict tobacco sales and consumption.**
- **Knowledge of lung cancer is rapidly expanding, with new techniques for early detection and improved therapy now being evaluated.**

2.2 Skin cancer

Epidemiology

Skin cancer is the most common cancer in Australia (Giles et al 1988). It can be divided into melanoma and non-melanocytic skin cancer, the latter being more numerous but less life threatening. Both types are common in Australia, and both have been identified as NHPA cancers.

Non-melanocytic skin cancers

There are no national incidence data but surveys have shown that the rate of treated non-melanocytic skin cancer is approximately six times that of the next most common cancer (Marks et al 1993). Provided non-melanocytic skin cancers are treated early, they can usually be cured. Despite this, mortality has been increasing since the late 1980s.

Table 2.3 Fast facts on non-melanocytic skin cancer

Australia	Males	Females
Incidence rate (per 100,00)* (1985)	944	714
Incidence rate (per 100,00)* (1995)	1,374	857
Deaths (1996)	252	117
Mortality rate (per 100,000)	3.1	1.0
Mortality trends (1990-96)	+0.5%pa	+10.1%pa
Potential years of life lost (0-74 years)	1,093	425
Lifetime risk (0-74 years)	1 in 655	1 in 1,974
Costs ($ '000) (1993-94)	111,503	75,489

* Treated non-melanocytic skin cancer.

Melanoma

Melanoma is the fourth most common cancer in males and the third most common cancer in females. In 1994, it accounted for 8.7 per cent of all new cancers in males and 9.4 per cent in females. Since the early 1980s, there has been a 66 per cent increase in male melanoma incidence and a 26 per cent increase in female melanoma incidence, with 3,695 and 3,081 new cases diagnosed in males and females respectively in 1994 alone.

Projections of incidence data indicate that the rate of melanoma in males will continue to rise to 49.1 per 100,000 (4,700 new cases) in 1999. The incidence rate in females is also likely to continue increasing, to a projected rate of 35.9 per 100,000 (3,800 new cases) in 1999. Five-year survival rates are good at around 90 per cent and higher at early stages of detection.

Between the 1950s and the 1990s, melanoma mortality increased five-fold in males and two-fold in females. In 1996, there were 586 male deaths and 326 female deaths from melanoma. However recently, melanoma mortality rates for both sexes have been relatively stable (Figure 2.3). Melanoma deaths result in approximately 11,000 potential years of life lost before the age of 75.

Figure 2.3 Melanoma — incidence and mortality trends

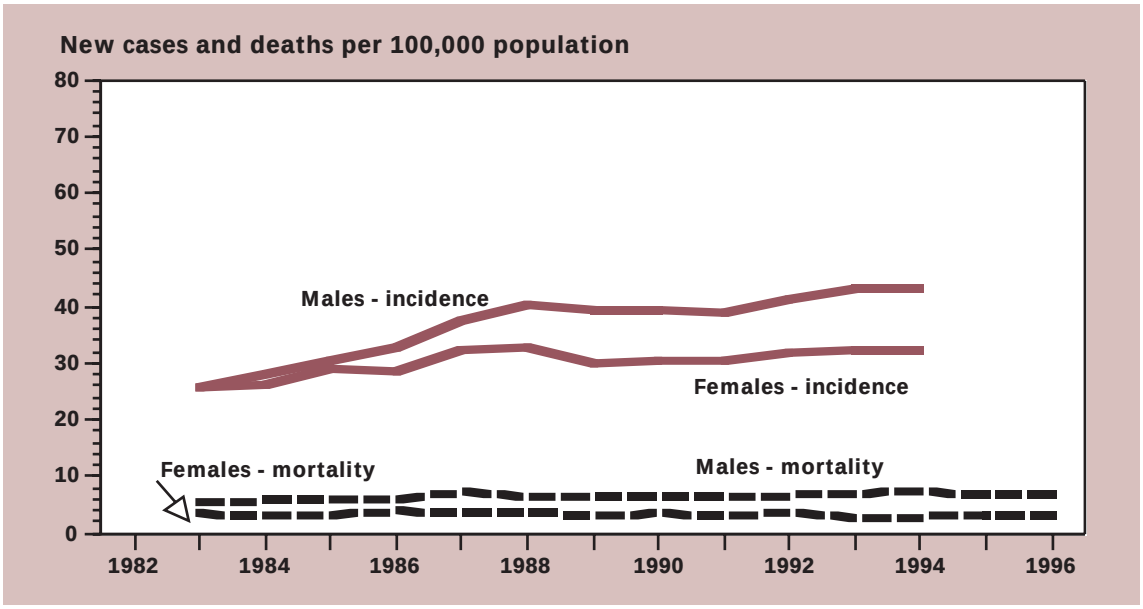


Table 2.4 Fast facts on melanoma

Australia	Males	Females
New cases (1994)	3,695	3,081
Incidence rate (per 100,000)	42.9	32.4
Incidence trends (1990-94)	+2.2%pa	+1.7%pa
% all new cancers	8.7	9.4
Lifetime risk (0-74 years)	1 in 28	1 in 37
Deaths (1996)	586	326
Mortality rate (per 100,000)	6.7	3.0
Mortality trends (1990-96)	+0.3%pa	+2.2%pa
Potential years of life lost (0-74 years)	7,070	3,940
Lifetime risk (0-74 years)	1 in 207	1 in 440
Costs ($ '000) (1993-94)	9,331	7,999

Table 2.5 States and Territories — melanoma

State/Territory	1991-94 Incidence		1991-94 Mortality	
	Males	Females	Males	Females
	New cases and deaths per 100,000 population			
NSW	44.3	31.4	7.9	3.2
VIC	30.2	25.7	5.7	2.9
QLD	54.9*	40.3*	8.2	3.3
WA	47.0	34.9	6.6	3.2
SA	38.1	32.9	4.6	2.8
TAS	32.3	26.9	4.3	2.7
ACT	35.0	25.0	6.7	3.3
NT	25.3	16.4	8.6	2.2

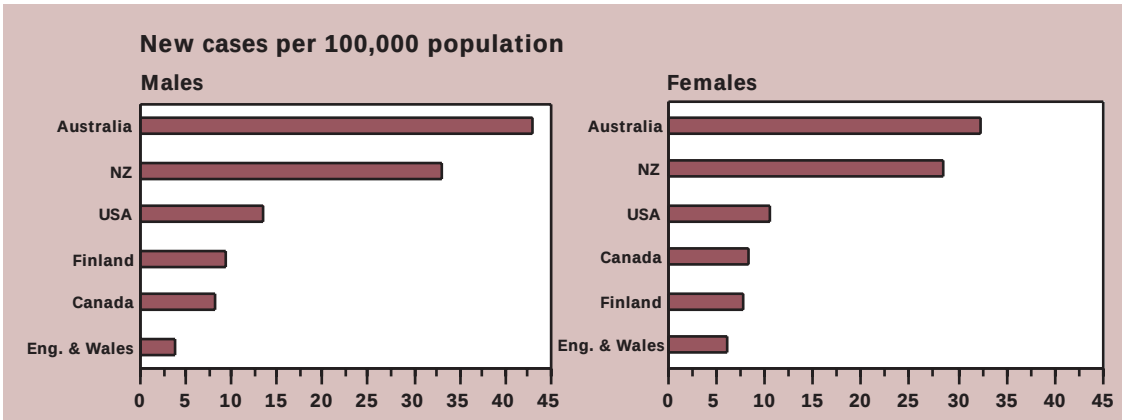
* Preliminary data.

Melanoma incidence shows the greatest geographical variation across Australia of any cancer (Table 2.5). This variation in incidence is directly related to the intensity of and exposure to ultraviolet (UV) radiation. Queensland has the highest rate of incidence among all jurisdictions (latest available incidence data 1990). However, in Tasmania and Victoria, the proportions of thicker melanomas, which are later stage and have poorer prognosis, are relatively high.

Limited information has become available on melanoma incidence among Indigenous Australians. Until recently, there has only been a few cancer registries which collected information identifying Indigenous Australians. However, international studies indicate that populations with a higher concentration of melanin in the skin have lower rates of skin cancer and it is expected that this pattern would also apply to Indigenous Australians. Australian-born populations have significantly higher mortality rates from melanoma than most migrant groups, except males born in New Zealand and females born in Malaysia, who have similar rates (Giles et al 1995).

There is a 300-fold variation in melanoma incidence rates internationally (Figure 2.5). These incidence differentials suggest that variations in UV exposure patterns contribute significantly to patterns of melanoma (Parkin et al 1997).

Figure 2.4 International comparisons — melanoma



Risk factors

Melanoma and non-melanocytic skin cancer are associated with UV radiation exposure. The incidence of skin cancer is higher in people with fair, sun-sensitive skin, those with pigmented naevi or moles on their skin, and those whose pattern of sun exposure has been intermittent, as indicated by high recreational exposure, or involved frequent sunburns. Epidemiological evidence suggests that over-exposure to sunlight in the first two decades of life is an important risk factor for the development of skin cancer later in life (Elwood 1992; Swerdlow et al 1986; Tucker et al 1993; Masri et al 1990; English & Armstrong 1988).

Specific genetic lesions have been identified in people with a family history of melanoma, but it is not yet possible to identify specific genetic markers in people with melanoma or skin cancer who do not have a family history of the disease (Aitken et al 1994; Easton et al 1991).

Prevention

Prevention programs in Australia have been based on behavioural research indicating that knowledge, beliefs and attitudes about melanoma, sunlight exposure and suntans are critical in determining behaviour (Hill et al 1993). Their primary focus is to reduce overall sun exposure and prevent sunburn, particularly among young people, principally through physical methods of protection (eg shade cloth and awnings). Such protection involves avoidance of exposure to direct sunlight (particularly within two hours each side of solar noon), use of sun-protective clothing, development of community facilities designed to increase shaded areas, and use of effective sun screening agents. The recent decision by the Australian Standards Association to allow the marketing of SPF 30 sunscreens may be beneficial to some Australians at high risk of skin cancer.

Programs such as ‘Slip, Slop, Slap’, ‘Sunsmart’ and ‘Me No Fry’ to protect against sunlight and supported by the Australian Cancer Society through Skin Cancer Awareness Week have been very successful. Research indicates that, at least for those parts of the country where data are available, awareness to protect against sunlight is high (Hill et al 1993; Baade et al 1996).

Screening and early detection

Early detection of skin cancer can significantly reduce associated morbidity and mortality. However, the Australian Cancer Society does not recommend mass population screening, on the basis of costs and a lack of reliable data on the efficacy of any screening tests.

The presentation of potential skin cancers is most likely to occur in the general practice setting. Screening in Australia is done on an *ad hoc* basis, targeting specific groups within the community and encouraging general practitioner screening of their patients, particularly those with high susceptibility.

Early detection, particularly of melanoma, has achieved a high level of success in Australia. In 1995, almost 4 per cent of Australians had a skin lesion excised. The ratio of benign pigmented lesions to invasive melanomas removed was between 16:1 and 28:1 (Burton et al 1993; Del Mar et al 1994). More than 80 per cent of those with melanoma are cured (Jelfs et al 1994; Jelfs et al 1996; Giles et al 1996). Nonetheless, approximately 900 people die of melanoma each year most of who are likely to have been diagnosed at a more advanced stage of the disease (Hersey et al 1991).

A wide variety of early diagnosis programs are already available in Australia. Many of these are part of prevention programs, but some specific early detection programs are conducted through the State and Territory cancer councils and individual organisations such as the Melanoma Foundation of the University of Sydney, the Australian College of Dermatologists and the Skin and Cancer Foundations in each State and Territory. 'Spot the Difference', 'Freckles, Moles, Sores and Sunspots' and 'The Mole Patrol' are current national programs. A *60 Minutes* television program in November 1987 entitled 'Goodbye Sunshine' resulted in the diagnosis of about 750 additional early melanomas in the six months following televising (McCarthy & Shaw 1990).

Each of the State and Territory cancer councils conducts specific programs targeting susceptible groups in the community, occasional programs on early diagnosis for general practitioners and the maintenance of early detection units ('battle stations' at beaches during the summer and video-based campaigns including interactive educational programs at appropriate community centres).

There is very little economic evidence about screening for melanoma. An Australian study has examined the potential cost-effectiveness of opportunistic melanoma screening by general practitioners (Girgis et al 1996). The costs vary from $6,853 per life year for men, if screening is undertaken five-yearly, to $12,137 if screening is two-yearly. The comparative estimates for women were $11,102 and $20,877 respectively.

Similar exploratory cost-effectiveness analysis has been undertaken of a national primary prevention program, along the lines of the Victorian SunSmart campaign (Carter et al, in press). The incremental cost-effectiveness, using a 'current practice' comparator, was $2,714 per life year (ignoring the cost offsets and using a conservative estimate of benefit).

A randomised controlled trial of a community based screening program for malignant melanoma is currently being undertaken in Queensland.

Treatment

The treatment of melanoma and non-melanocytic skin cancer has not changed significantly in the last few years. Surgery remains the mainstay of therapy for all common skin cancers, but a variety of other techniques are used to deal with early basal, and some early squamous, skin cancers. These early stages of cancer are treated by cryosurgery, diathermy curettage, laser ablation and in some cases cytotoxic creams. In recent years, an interest has developed in the treatment of basal cell carcinomas by interferon injection (Cornell et al 1990). Laser surgery is also rarely used because the laser energy oblates the tumour entirely, leaving no tissue for examination by the pathologist (Cornell et al 1990). The use of radiotherapy is also largely restricted to the management of skin cancers not treatable by the other modalities. Comprehensive guidelines have been published by the Australasian Cancer Network (ACN) for the treatment of cutaneous melanoma (Australasian Cancer Network 1997).

In the treatment of melanoma, the most important change has been a move towards less radical excisions of primary tumours. The ACN guidelines recommend a range of excision margins, based on the results of two randomised controlled trials (Balch et al 1993; Veronesi & Cascinelli 1991; Karakousis et al 1996). The ACN guidelines also cover all the following aspects of the management of melanoma:

- For the management of enlarged lymph nodes, needle biopsy is recommended in preference to open biopsy of the lymph node because of the risk of tumour cell spillage (Balch etal 1992). Radical node dissection is generally accepted as the treatment of choice for lymph nodes involved with melanoma.
- Several centres around the world are engaged in a clinical trial of a new technique for the management of melanomas deeper than 1 mm (Morton et al 1992; Thompson et al 1995). The technique is known as selective lymphadenectomy or sentinel node biopsy and involves selective identification of positive lymph nodes for node dissection. The treatment is regarded as experimental and is not recommended for general use before the completion of the international controlled trial.
- Adjuvant therapy for deep melanoma or melanoma involving lymph nodes is also the subject of a number of controlled clinical trials around the world (Houghton & Balch 1992; Parkinson et al 1992). These trials are based on either chemotherapy or immunotherapy protocols, but to date the outcomes do not justify routine use of these modalities.
- The management of disseminated melanoma remains a problem. Current protocols with a variety of agents have not demonstrated long-term benefit. Most people with disseminated melanoma are now placed on experimental immunotherapeutic or chemotherapeutic protocols.

The most likely change to the management of melanoma in the immediate future is the possible adoption of the sentinel node biopsy technique as standard procedure for the management of intermediate thickness and deeper melanoma. In the USA,

many centres are now using the selective lymph node technique as a staging procedure to determine patients who should have interferon added to their treatment regimen. Interferon is regarded as appropriate for patients with melanomas deeper than 4 mm or those who have proven metastases to the lymph nodes (Nathanson 1996). The adjuvant interferon therapy has the potential to become an established mode of treatement in the near future. However this procedure is not generally accepted as appropriate for Australian patients with melanoma because of the high levels of toxicity.

Skin cancer — current status

- **Skin cancer is the most common cancer in Australia and Australia has the highest incidence rate in the world. The estimated early detection and treatment costs for skin cancers are higher than the costs for any other cancer in Australia.**
- **Primary prevention programs in Australia have been successful in raising awareness of the dangers of exposure to sunlight and have been generally effective in encouraging people to take preventive actions.**
- **Opportunistic screening by general practitioners and targeting of specific high-risk population groups remain useful methods for early detection and diagnosis of skin cancer.**

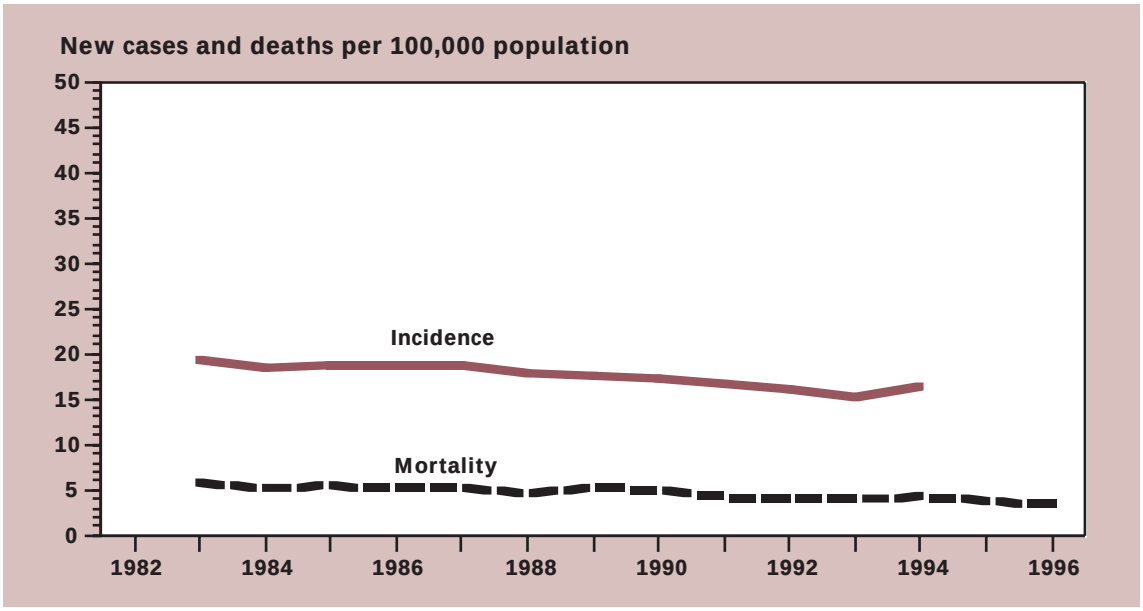
2.3 Cancer of the cervix

Epidemiology

Cancer of the cervix is the eighth most common cancer in Australian females. Cancer of the cervix rarely affects women before the age of 30. In 1994, there were 1,121 new cases diagnosed and cancer of the cervix accounted for 3.4 per cent of all new cancers in females. Projections of incidence data indicate that the rate of cancer of the cervix will continue to fall to 10.4 per 100,000 (approximately 1,100 new cases) by 1999 (Figure 2.5).

Mortality from cancer of the cervix has been declining since this cancer was able to be identified separately from other genital cancers in 1942. In 1996, 302 women died from the disease (Table 2.6), accounting for 2.4 per cent of all cancer deaths among females. Mortality from cancer of the cervix resulted in approximately 4,300 potential years of life lost before the age of 74. This decline reflects the introduction and widespread use of the Papanicolaou (Pap) smear screening test, and the subsequent treatment of precancerous abnormalities. Five-year survival rates are around 72 per cent.

Figure 2.5 Cervical cancer — incidence and mortality trends (20–74 year old females)



There is limited variability in cancer of the cervix incidence rates between Australian States and Territories, the exceptions being South Australia (9.2 per 100,000) and the Northern Territory (16.6 per 100,000) with the lowest and highest rates of age-standardised incidence respectively (Table 2.7). However, rates for the Northern Territory are subject to wide variability due to the relatively small size of the population.

National incidence and mortalty data are not available for Indigenous Australians. Incidence data from the Northern Territory indicate that the rate of cancer of the cervix is higher among Indigenous than non-Indigenous females (d'Espaignet et al 1996). Mortality data indicate that Indigenous females are eight times more likely to die from cervical cancer than non-Indigenous females (Anderson et al 1996).

Table 2.6 Fast facts on cancer of the cervix

Australia	Females 20-74 years*	Females all ages
New cases (1994)	989	1,121
Incidence rate (per 100,000)	16.5	12.0
Incidence trends (1990-94)	-1.3%pa	-0.8%pa
% all new cancers	4.2	3.4
Lifetime risk (0-74 years)	1 in 101	1 in 101
Deaths (1996)	217	302
Mortality rate (per 100,000)	3.4	2.9
Mortality trends (1990-96)	-5.8%pa	-4.4%pa
Potential years of life lost (0-74 years)	4,288	4,288
Lifetime risk (0-74 years)	1 in 415	1 in 415
Costs ($ '000) (1993-94)	8,822	10,148

* Lifetime risk (20–74 years); Potential years of life lost (20–74 years); Costs (25–74 years).

Table 2.7 States and Territories — cancer of the cervix

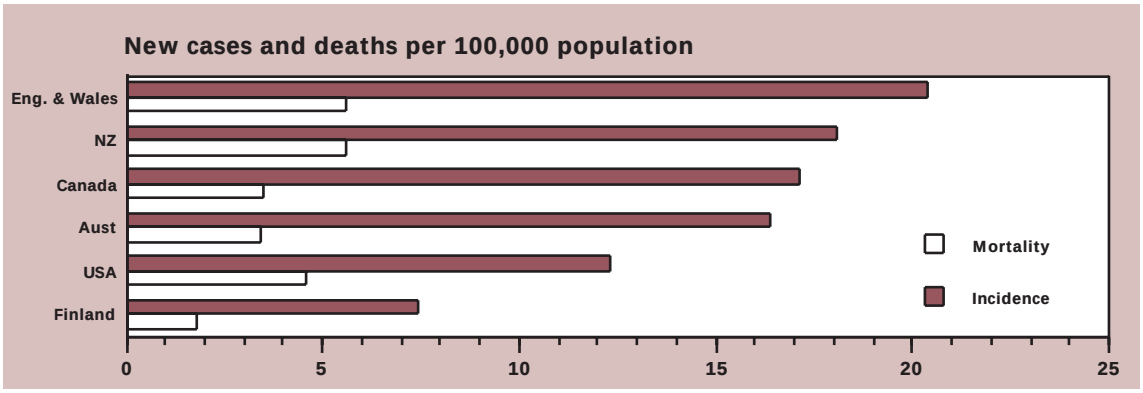
	1991-94 Incidence		1991-96 Mortality	
State/Territory	20-74 years	All ages	20-74 years	All ages
	New cases and deaths per 100,000 population			
NSW	16.0	11.6	4.1	3.3
VIC	15.7	11.3	4.0	3.3
QLD	16.3*	11.8*	3.8	3.3
WA	17.2	12.4	4.5	3.7
SA	12.9	9.2	2.8	2.4
TAS	15.4	11.8	6.2	4.8
ACT	14.4	10.3	3.3	3.2
NT	20.8	16.6	14.5	12.3

* Preliminary data.

In Australia, females born in Fiji and Vietnam have a higher incidence of cancer of the cervix than the Australian-born female population (MacCredie et al 1993). Females born in the Pacific Islands, Scotland and Germany have significantly higher age-standardised mortality rates than do Australian-born females (Giles et al 1995).

Incidence of cancer of the cervix internationally varies by a factor of approximately 30. Among women aged 20–74 years, Australia has a moderate rate of incidence (16.5 per 100,000) and mortality (3.4 per 100,000) when compared internationally (Figure 2.6). The incidence rate in England and Wales is around 21 per 100,000, while in Finland it is 7.5 per 100,000. Cancer of the cervix is a leading cause of death in non-industrialised countries.

Figure 2.6 International comparisons — cancer of the cervix (20–74 year old females)



Note: Age-standardised rates for Australia (incidence—1994; mortality—1996) and other selected countries (incidence—1983–95; mortality—1993–94), age group 20–74 years.

Risk factors

Cancer of the cervix is related to infection with the human papilloma virus (HPV), particularly genotypes 16 and 18 and to a lesser extent 31 and 33. Many women are infected with one or more HPV genotypes but less than 2 per cent develop cancer of the cervix. The latency period between HPV infection and cancer detection varies widely, with estimates ranging between 5 and 25 years.

Other risk factors for precancerous and cancerous lesions of the cervix are multifactorial. The major risk factors are age, sexual behaviour (young age at first intercourse and the number of sexual partners), smoking, socio-economic status and race.

Prevention

Our current knowledge of the risk factors for cancer of the cervix, other than age and sexual behaviour, does not allow the identification of high-risk groups that require screening. In the absence of this information, cervical cancer screening must be carried out on a population basis. Opportunistic screening using the Pap smear test to detect precancerous abnormalities of the cervix has been carried out since the mid-1960s. In 1991, Australia adopted a national cervical screening program to further increase participation rates and improve the quality of all steps in the screening pathway.

Within this program, recruitment strategies have to take account of groups whose participation rates may be low, for example older, Indigenous and non-English speaking females.

A prophylactic vaccine for HPV infection aimed at young adults before the onset of sexual activity is one possible approach to primary prevention, but major issues need to be addressed before the necessary clinical trials can proceed. These include: identification of relevant genotypes; evidence that vaccination against HPV infection is effective; and ethical considerations.

Screening and early detection

The current policy in Australia is for women who have ever had sexual intercourse to have two-yearly smears, from the age of around 20 years until 70 years. Females who have negative smears, and no signs and symptoms of abnormality, are advised to have a repeat smear in two years. Women whose Pap smears are reported as showing evidence of cervical intra-epithelial neoplasia are advised to have a colposcopy, a biopsy and treatment if the neoplasia is confirmed.

For the cervical screening program, the participation rate varies across age groups. For the period 1992–94, 55 per cent of the women aged 20–29, 69 per cent of those aged 30–39, 70 per cent of those aged 40–49, 63 per cent of those aged 50–59, and 39 per cent of those aged 60–69 participated in the screening program. Participation rates have improved over the last decade, especially among older women, although women over 60 remain an underscreened group.

Participation rates do not appear to be as high among women from non-English speaking backgrounds or among Indigenous females. Most States and Territories have strategies in place or under development to increase participation in cervical screening, targeting groups with lower participation rates. A reduction from Australia's current annual age-standardised incidence rate for cancer of the cervix of 11 per 100,000 to 3 per 100,000 women is achievable through the full implementation of an evidence-based cervical screening program (Ward 1997).

Efficient and effective analysis and communication of Pap test results are central to early diagnosis of cancer of the cervix. Adequate management and follow-up of abnormalities are critical for an effective screening program (AIHW 1991). A first step in this process must be adequate communication of the result to women so as to facilitate further assessment, but also to minimise the psychological impact of the result in the interim between notification and diagnosis (Austoker et al 1997).

All States and Territories (except Queensland) have Cervical Cytology Registries to encourage regular attendance by women, to provide a safety net so that women with abnormal Pap smears are not overlooked, and to assist pathology laboratories with both the day-to-day reporting of Pap smears and the provision of essential information for quality assurance. A cervical cytology register in Queensland is planned to begin operation in 1998.

There have been several Australian studies of the cost-effectiveness of cervical screening. The most appropriate age to begin screening seems to be the most contentious economic issue. Current Australian policy of including the 18–24 year age group costs approximately $17 million per life saved in this age group. The high cost has led several countries to raise the age of first screening to 30 or 35 years. A national evaluation has estimated that a three-year interval, combined with a screened age group of 25–69, would improve average cost-effectiveness of cervical screening from $30,700 to $23,700 per life year (AIHW 1991). A recent review of the policy (Harris and Scott 1995) confirmed that 'age of screening is a critical variable in cost-effectiveness of the program'.

There is limited evidence on the optimal distribution of resources along the screening pathway. However, given that the majority of deaths from cancer of the cervix occur in women who have never been screened, or who have been under-screened, there is potential benefit from focussing on effective recruitment to the screening program.

Treatment

Precancerous lesions

If a high-grade precancerous abnormality is proven on biopsy, treatment will depend on whether the whole of the abnormality can be seen ('in range') or whether the abnormality is 'out of range' and extends into the canal of the cervix. The diagnosis and relevant pathological parameters for cancer of the cervix need to be confirmed by a pathologist.

Treatments for in-range abnormalities include laser ablation, cervical diathermy and loop excision of the transformation zone. An out-of-range abnormality is usually treated with cone biopsy.

Early stage cancer of the cervix

Very early stage (Ia) carcinoma of the cervix can be treated with a cone biopsy or hysterectomy. Slightly more advanced squamous carcinomas (Stages Ib, IIa) are treated with either radical hysterectomy or radical radiotherapy, with both treatments showing equivalent cure rates (Landoni et al 1997). Patients treated primarily with radical radiotherapy for early-stage squamous cell carcinoma of the cervix have not demonstrated any survival benefit from the addition of routine hysterectomy following radiotherapy (Landoni et al 1997).

The optimal treatment for cervical adenocarcinoma has been controversial, but a recent randomised trial supports previous non-randomised studies that suggest a significant survival advantage for radical surgery over radiotherapy (Landoni et al 1997).

Advanced disease

The primary treatment for advanced cancer of the cervix is radiotherapy, combining external beam and brachytherapy. The use of combined chemotherapy and radiotherapy is under investigation, but as yet has shown no clear benefit. There is no proven benefit from neo-adjuvant chemotherapy before radiation therapy or from adjuvant chemotherapy following radical surgery.

Patients presenting with recurrent pelvic disease after primary surgery should be treated with radical radiation therapy. Cure rates of approximately 20–40 per cent can be expected (NIH Consensus Statement 1997; Thomson 1992).

Chemotherapy may be used for recurrent disease not suitable for treatment with either surgery or radiotherapy (Curtin & Shapiro 1997; Trope & Kristensen 1997). Cisplatin appears to be the most active single agent and survival duration does not appear to be improved with multi-agent chemotherapy (Vermorken 1993).

Future developments in treatment are likely to include a clarification of the roles of minimally invasive surgery in the treatment of early-stage cancer of the cervix. Preradiotherapy staging of advanced tumours, HPV vaccines in the treatment of established cancers, and chemotherapy as an alternative to radiotherapy and surgery are likely to be other treatment modalites.

Cancer of the cervix — current status

- **Cancer of the cervix is the eighth most common cancer among Australian women. Its incidence and mortality have been falling for many years. This has been mainly due to the widespread use of the Pap smear screening test and the subsequent treatment of precancerous abnormalities.**
- **Cancer of the cervix is one of the few cancers where precancerous lesions are detectable and treatable. Hence, this cancer could be almost totally prevented with current screening methods.**
- **A major window of opportunity for reducing the impact of cancer of the cervix remains the detection of precancerous changes through the National Cervical Screening Program. Most cases of cancer of the cervix could be prevented if all women at risk were screened every two years.**

2.4 Breast cancer

Epidemiology

Breast cancer is the most common cancer and cause of cancer deaths among females in Australia with nearly 9,700 new cases diagnosed each year and 2,600 deaths. In 1994, breast cancer accounted for 29.5 per cent of all new cancers in females and 18.6 per cent of all cancer deaths in females. This cancer mostly affects women after the age of 40.

Between 1983 and 1989, there was a steady increase in breast cancer incidence (Figure 2.7). Between 1990 and 1994, the increase was more rapid, at an average of 6 per cent per year. Semi-national incidence data for 1995 and 1996 from New South Wales, Victoria, South Australia, Western Australia and Tasmania indicate a peak in 1995 and a slight fall in 1996. Taking into account these semi-national data, the average annual increase in the incidence rate is moderated to approximately 4 per cent. This upward trend may have been in part a result of the BreastScreen Australia program, but there has also been a real increase in disease rates as well. Projections of incidence data indicate that the rate of breast cancer will decrease slightly to 98.6 per 100,000 by 1999.

In contrast, mortality rates for breast cancer have remained relatively stable since 1983 (Figure 2.7). In 1996, there were 2,623 breast cancer deaths among females, resulting in approximately 31,000 potential years of life lost before the age of 74 years (Table 2.8). Five-year survival rates are approximately 75 per cent. Based in these measures, breast cancer is the most significant cancer in Australian females.

Figure 2.7 Breast cancer — incidence and mortality trends (50–74 year old females)

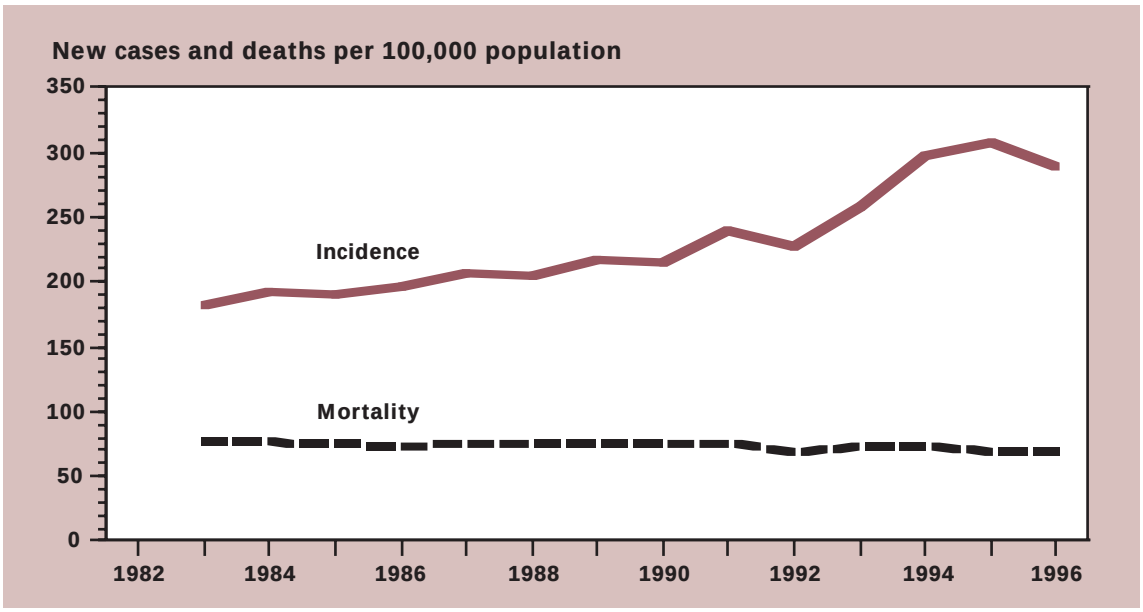


Table 2.8 Fast facts on breast cancer

Australia	Females 50-74 years*	Females all ages
New cases (1994)	5,553	9,694
Incidence rate (per 100,000)	297.1	100.9
Incidence trends (1990-94)	+8.3%pa	+5.7%pa
% all new cancers	32.3	29.5
Lifetime risk (0-74 years)	1 in 14	1 in 11
Deaths (1996)	1,340	2,623
Mortality rate (per 100,000)	69.0	25.0
Mortality trends (1990-96)	-1.3%pa	-1.0%pa
Potential years of life lost (0-74 years)	15,830	30,765
Lifetime risk (0-74 years)	1 in 57	1 in 48
Costs ($ '000) (1993-94)	39,851	93,434

* Lifetime risk (50–74 years); Potential years of life lost (50–74 years); Costs (50–74 years).

Table 2.9 States and Territories — breast cancer

	1991–94 Incidence		1991–96 Mortality	
State /Territory	50–74 years	All ages	50–74 years	All ages
	New cases and deaths per 100,000 population			
NSW	256.3	91.9	68.9	25.0
VIC	256.3	91.9	77.5	28.0
QLD	257.4*	92.8*	65.2	24.3
WA	256.6	93.1	68.4	25.1
SA	264.0	91.0	76.5	26.6
TAS	251.0	90.2	63.3	23.7
ACT	250.9	88.6	98.1	33.0
NT	159.2	61.7	66.2	18.3

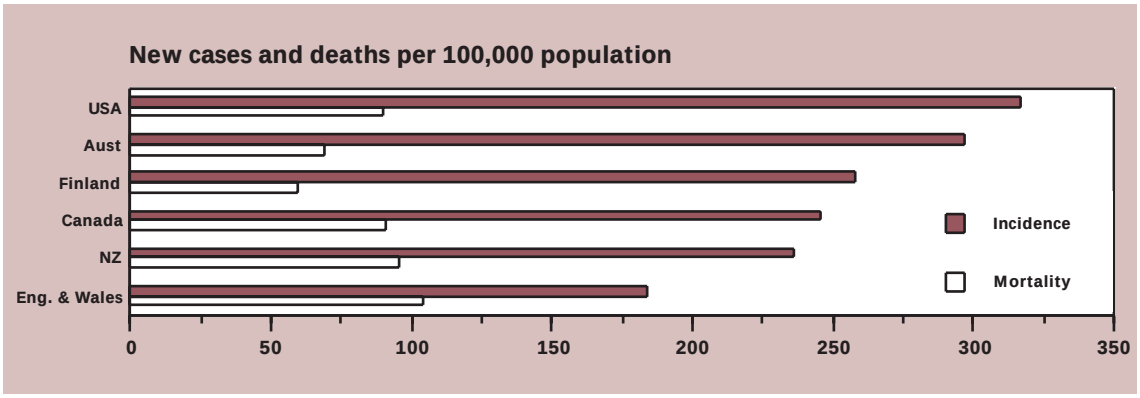
* Preliminary data.

There is limited variability in breast cancer incidence between Australian States and Territories (Table 2.9). Incidence rates for the Northern Territory are lower, but are subject to wide variability due to the relatively small size of the population. National incidence and mortality data are not available for Indigenous females. Data from Western Australia indicate that the incidence of breast cancer may be lower in Indigenous females than in non-Indigenous females. However, this data should be interpreted with caution as there is evidence of under-reporting of Indigenous status on cancer registries.

In Australia, females born in the United Kingdom, the Netherlands and the United States appear to have significantly higher age-standardised mortality rates than Australian-born females (Giles et al 1995).

There is a seven-fold variation in breast cancer incidence internationally (Giles et al 1995). Australia ranks above average for incidence and average for mortality among women aged 50–74 years (Figure 2.8). The United States and Australia have incidence rates of around 300 per 100,000. Finland, Canada and New Zealand have rates around 250 per 100,000 and England and Wales rates of about 180 per 100,000.

Figure 2.8 International comparisons — breast cancer



Note: Age-standardised rates for Australia (incidence—1994; mortaliy—1996) and other selected countries (incidence—1983–95; mortality—1993–94), age group 50–74 years.

Risk factors

Known risk factors account for only a third of all breast cancers. Age is the best indicator of risk, with women over the age of 50 accounting for over 74 per cent of all new cases. Significant family history of breast cancer (first degree relative with breast cancer occurring before 50 years of age and/or more than one relative on the same side of the family affected) and previous history of certain benign breast diseases (Bruzzi et al 1997) are significant indicators of risk.

Other factors which may play a role in increasing risk of breast cancer include:

- larger body size;
- reproductive factors including late age at first birth, nulliparity, early menarche and late age at menopause;
- long-term use of exogenous oestrogens in hormone replacement therapy; and
- exposure of breast tissue to ionising radiation (especially before 20 years of age) (Kricker & Jelfs 1996).

Family history of breast cancer has been linked to specific gene mutations, including BRCA1 and BRCA2, in about 5 per cent of cases.

Prevention

The known risk factors for breast cancer are not readily modifiable, nor do they appear to be implicated in up to 70 per cent of cancer incidence, so there are few opportunities for primary prevention of the disease.

The main scope for reducing mortality from breast cancer is through early detection, particularly through an organised mammographic screening program.

Screening and early detection

The early detection of breast cancer has a significant impact on survival. The five-year survival of women whose breast cancer is diagnosed while it is still localised in the breast is 90 per cent, compared with 18 per cent among women who have metastases at diagnosis (Taylor et al 1994).

Mammography improves overall mortality as well as five-year survival. Randomised trials of population-based mammographic screening have found a 30 per cent decrease in mortality from breast cancer among women aged 50–69 years (Fletcher et al 1993). These results are considered to be achievable by well-organised and high quality breast screening programs (Fletcher et al 1993).

BreastScreen Australia was established as a national mammographic screening program in mid-1991. It offers free two-yearly mammographic screening, actively targeting women aged 50–69 years, but women aged 40–49 years and those over 70 years of age are also able to participate if they choose. The NHPA program monitors mortality in women for a further five-years (up to age 74), to measure the benefits of the screening program. In July 1997, there were 36 screening and assessment services with 102 fixed and 23 mobile screening units. Quality assurance is addressed through National Accreditation Requirements and a National Quality Management Committee. Stringent quality assurance standards aim to ensure that screening detects as many small cancers as possible, while minimising the costs to individuals and to the community.

The screening indicator reported against in the *First Report on National Health Priority Areas* (AIHW & DHFS 1997) examines the proportion of women attending screening within a defined target population. For the national breast cancer screening program, the 1994–95 data indicate that 44 per cent of women in the 50–69 years age group attended screening (AIHW & DHFS 1997). BreastScreen Australia estimates a current participation rate of 54 per cent of women aged 50–69 years (BreastScreen Australia, preliminary unpublished data).

There have been several Australian studies of the cost-effectiveness of screening for breast cancer, which have estimated the cost per life year at about $20,000 for all women over 40 years and $45,000–$49,000 for women aged 40–49 years (Carter et al, in press; Irwig et al 1997). The cost-effectiveness of screening women aged 40–49 years is considered to be marginal. According to one study (Carter 1997), incidence-to-mortality ratios and higher cost structures related to quality and geography combine to make Australia's cost-effectiveness ratio for screening women aged 50–69 years(A$17,031) three times higher than that in the Netherlands (A$5,685) or the UK (A$4,827).

Early diagnosis of symptomatic disease

It is estimated that no more than 30 per cent of all breast cancers and 45 per cent of breast cancers among women aged 50–69 years will be detected by mammographic screening, even when the national program is fully expanded (Kricker, in press). The prompt diagnosis of symptomatic disease therefore remains important in reducing mortality from breast cancer.

There are currently no national data about the proportion of breast cancers diagnosed at an early and treatable stage; however, data from New South Wales suggest that there are considerable opportunities for improving early detection, with over half of all breast cancers being greater than 20 mm at diagnosis (Kricker et al 1995; Kricker et al, in press).

Almost 20 per cent of women are estimated to experience a breast symptom in a two-year period, resulting in up to 350,000 consultations in general practice every year (Barratt & Vainio 1997). In 1997, the NHMRC National Breast Cancer Centre released evidence-based guidelines to assist general practitioners in investigating breast symptoms, entitled *Report on the Evidence Relevant to Guidelines for the Diagnosis of Symptomatic Women* (Irwig 1997).

Pathology reporting

Except under BreastScreen Australia, reporting of breast pathology in Australia is inconsistent. The Australasian Cancer Network has developed recommendations about reporting (Australasian Cancer Network Working Party 1997), but currently not all breast cancer is reported according to these recommendations (Kricker et al, in press).

Treatment

Several different aspects of the management of breast cancer have been shown to improve survival and/or wellbeing. For early breast cancer, these are summarised in the NHMRC *Clinical Practice Guidelines: the Management of Early Breast Cancer* (NHMRC 1995). The following recommendations are based on level I or II evidence (for definitions of levels of evidence see Appendix 2):

- Appropriate counselling has the potential to improve quality of life.
- The survival of patients with breast and other cancers is better if they are treated by a specialist who also treats a number of other similar patients, and who has access to the full range of treatment options in a multidisciplinary setting.
- There is no difference in the rate of survival or distant metastasis between women having mastectomy and those having breast-conserving surgery where appropriate.
- Not all women with nodal disease on axillary sampling develop metastases. Survival rates are not decreased by delaying radiotherapy to the axilla, although local control is less likely.

- Radiotherapy after lumpectomy significantly reduces the risk of local recurrence. The omission of radiotherapy, even in carefully selected patients, leads to an increased risk of local recurrence. Overall, the routine addition of radiotherapy to surgery causes no significant change in mortality in the first 10 years, but an excess late mortality from cardiac causes may result. However, the excess in cardiac deaths is more than offset by a reduction in breast cancer deaths as revealed by some recent trials.
- Tamoxifen, multi-agent chemotherapy and ovarian ablation all reduce annual risk of recurrence and death after treatment for women under the age of 50 years with node-positive as well as node-negative breast cancers. Optimal dose intensity is important to favourable outcomes in adjuvant chemotherapy.
- Women with oestrogen-receptor negative tumours have a poorer prognosis than those with oestrogen-receptor positive tumours.
- Intensive follow-up confers no survival benefit over a minimalist schedule.

Best-practice guidelines on the management of advanced breast cancer and of ductal carcinoma *in situ* are currently being developed by the NHMRC National Breast Cancer Centre. Detailed examinations of the evidence about specific issues such as post-mastectomy radiotherapy, the use of high-dose chemotherapy and autologous bone marrow transplantation are also being conducted. The development of an evidence-based approach is being assisted by the Cochrane Collaboration Review Group in Breast Cancer.

Current practice

Relatively little is known about current practice in the management of breast cancer in Australia. There have been three state-based surveys of management practices so far (Byrne et al 1993; Hill et al 1990a; Hill et al 1995); however, these were undertaken several years ago, were based in single States and did not assess all relevant aspects of care. The NHMRC National Breast Cancer Centre has commissioned a national survey of the management of breast cancer to generate national data about current practice in 1998.

The NHMRC *Clinical Practice Guidelines: the Management of Early Breast Cancer* were released in October 1995 and surveys of clinicians suggest that these guidelines are now part of routine practice (Carrick et al, in press).

Breast cancer — current status

- **Breast cancer remains the most common cause of female cancer deaths in Australia, with over 2,500 women dying each year from the disease. Breast cancer incidence is currently rising at about 4 per cent per year.**
- **The major scope for reducing the impact of breast cancer is early detection through the national mammographic screening program (BeastScreen Australia), prompt diagnosis, and effective treatment based on the latest evidence.**

2.5 Colorectal cancer

Epidemiology

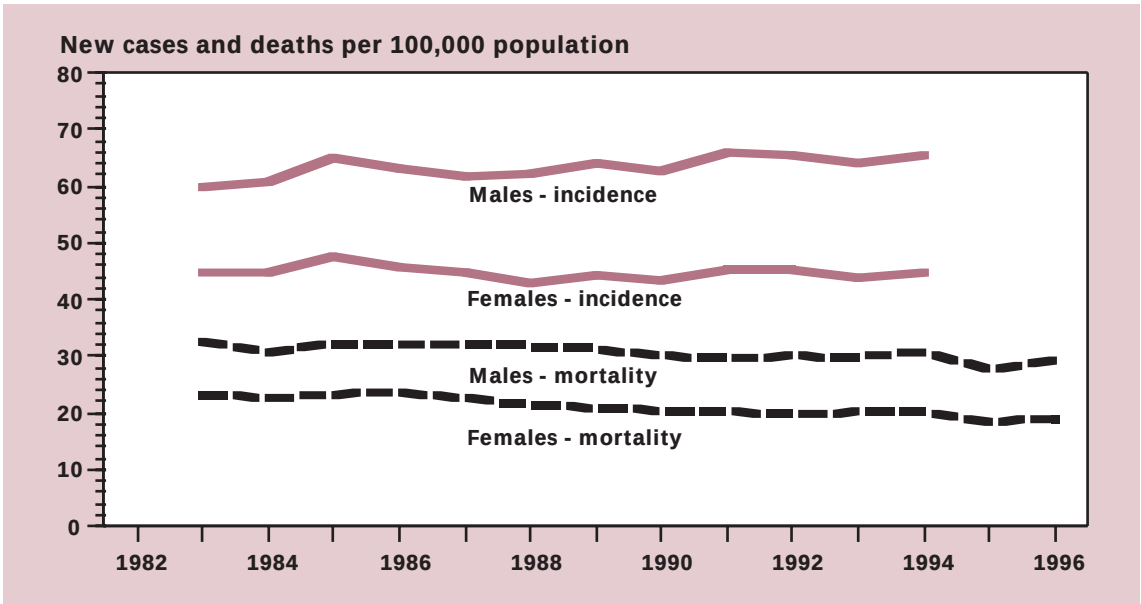
Colorectal cancer (or bowel cancer) is the second most common cancer affecting both men and women in Australia and the second most common cause of cancer deaths. Five-year survival rates are moderate at around 55 per cent although early detection results in better survival.

Since the early 1980s, both incidence and mortality rates for colorectal cancer have been relatively stable (Figure 2.9). In 1994, there were 5,433 new cases of colorectal cancer diagnosed in males and 4,583 new cases diagnosed in females (Table 2.10), accounting for 12.7 and 13.9 per cent of all new cancers in males and females, respectively. About one in 20 Australians is likely to develop colorectal cancer during his/her lifetime, with the risk increasing after the age of 40 and rising sharply and progressively from the age of 50 years.

Projections indicate that Australia's incidence rate of colorectal cancer in males will continue to rise slowly to 67.4 per 100,000 (approximately 6,300 new cases) in 1999. Incidence rates for females are projected to increase slowly to a rate of 45.8 per 100,000 (approximately 5,300 new cases) in 1999.

In 1996, 2,506 males and 2,112 females died from colorectal cancer with premature mortality resulting in approximately 31,000 potential years of life lost before the age of 75 (Table 2.10). Based on mortality measures alone, it is one of the most significant cancers in Australia.

Figure 2.9 Colorectal cancer — incidence and mortality trends



There is limited variability between Australian States and Territories in colorectal cancer incidence rates (Table 2.11). Incidence rates for the Northern Territory are lower, but are subject to wide variability due to the relatively small size of the population.

Table 2.10 Fast facts on colorectal cancer

Australia	Males	Females
New cases (1994)	5,433	4,583
Incidence rate (per 100,000)	65.6	44.9
Incidence trends (1990-94)	+1.1%pa	+0.9%pa
% all new cancers	12.7	13.9
Lifetime risk (0-74 years)	1 in 18	1 in 27
Deaths (1996)	2,506	2,112
Mortality rate (per 100,000)	29.2	18.9
Mortality trends (1990-96)	-0.4%pa	-1.3%pa
Potential years of life lost (0-74 years)	17,888	13,118
Lifetime risk (0-74 years)	1 in 43	1 in 71
Costs ($ '000) (1993-94)	81,950	70,108

Table 2.11 States and Territories — colorectal cancer

	1991-94 Incidence		1991-94 Mortality	
State/Territory	Males	Females	Males	Females
	New cases and deaths per 100,000 population			
NSW	66.5	44.5	28.4	18.1
VIC	68.1	49.0	31.7	21.6
QLD	65.7*	45.4*	28.4	18.6
WA	63.6	45.1	27.8	20.0
SA	66.0	46.9	29.2	19.2
TAS	68.3	48.3	33.4	22.6
ACT	67.8	48.2	34.3	21.8
NT	48.0	35.3	24.2	21.8

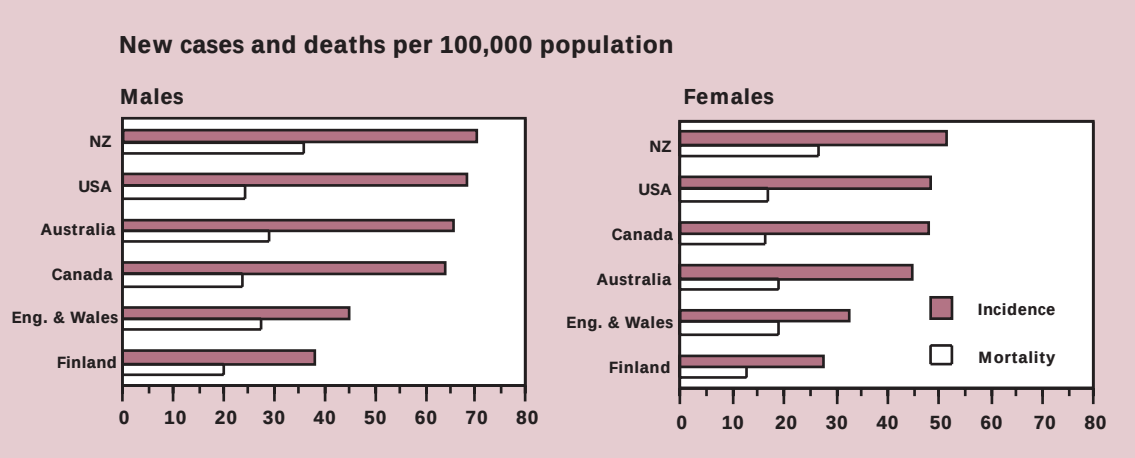
* Preliminary data.

National incidence and mortality data are not available for Indigenous Australians. Data from Western Australia and the Northern Territory indicate that incidence rates in Indigenous males are substantially lower than in non-Indigenous males, while rates in females are approximately the same or slightly lower. However, these data should be interpreted with caution as there is evidence of under-reporting of Indigenous status on cancer registries.

Australian-born persons have significantly higher rates of colorectal cancer than many of the major migrant groups in Australia (Giles et al 1995).

Internationally, colorectal cancer incidence varies by a factor of 20 in men and 15 in women. Australia's incidence and mortality rates rank high. Most of the developed countries have incidence rates of around 65 per 100,000 for males, although England, Wales and Finland had rates around 40 per 100,000 recently. A similar pattern occurs for females, although the rates are lower (Figure 2.10).

Figure 2.10 International comparisons — colorectal cancer



Note: Rates are age-standardised for Australia (incidence—1994; mortality—1996) and other selected countries (incidence—1983–95; mortality—1993–94).

Risk factors

Colorectal cancer is known to be associated with a diet high in fat and low in fruit and vegetables, reduced physical activity, increased alcohol consumption, previous history of polyps in the bowel, and in particular a family history of familial adenomatous polyposis (FAP) or colorectal cancer (Schottenfeld & Winawer 1996).

Prevention

There is evidence that consumption of vegetables are protective against colorectal cancer (Kune et al 1997). However, trials have failed to confirm that using carotenoids and other anti-oxidants present in vegetables can prevent the disease (Potter 1996; Potter et al 1997; MacLennan et al 1995). Poorly soluble cereal fibres such as wheat bran may also be protective. Dietary prevention strategies advocate consumption of a broad range of vegetables and unrefined cereals (Potter et al 1997).

Several studies are exploring the possible protective effects of resistant starch, aspirin and other non-steroidal anti-inflammatory drugs, selenium and phytochemicals, and possible harmful effects of browning of meat during grilling and frying (Potter et al 1997; Thun 1996; Gerhardsson et al 1991). For some of these (eg non-steroidal anti-inflammatory drugs), the effect appears especially strong (IARC 1997).

Screening and early detection

In most cases of colorectal cancer, a treatable benign precursor lesion, the adenomatous polyp, is easily recognisable. The process of change from adenomatous polyp to malignancy is usually slow, and even after a cancer has developed the metastatic spread is usually limited until the cancer is relatively large. This contrasts with cancers such as melanoma and breast cancer, where cancers can metastasise unpredictably even in early stages of development, and excision of early lesions does not guarantee eradication of the cancer.

Despite the obvious benefits of early detection, there has been no systematic screening program in Australia because of considerable debate here and overseas about which age and risk groups to target, which test or combinations of tests are the most effective, and questions about public acceptance of and compliance with testing strategies.

Screening of high and average risk groups currently operates in an *ad hoc* manner (AHTAC 1997). High-risk groups for colorectal cancer can be easily identified, usually from having a characteristic family history. Organised programs are in place to screen for inherited conditions such as FAP and hereditary non-polyposis colon cancer. There is also some State-based screening of various employee groups in the community.

Screening tests

Major international trials have reported a reduction in mortality following screening through the faecal occult blood test (FOBT). Up to 33 per cent reduction in mortality following annual testing (Mandel et al 1993) and a 15–18 per cent reduction following biennial testing (Kronborg et al 1996; Hardcastle et al 1996) have been reported.

However, the FOBT is known to lack sensitivity and specificity. Its sensitivity for large adenomatous polyps is about 11 per cent, and for larger polyps or early cancer, about 29 per cent (Ahlquist et al 1989). The false-positives rate may reach up to 10 per cent. Newer methods, including human haemoglobin immuno assay, should improve the test.

Follow up of positive occult bloods are usually done with colonoscopy or double-contrast barium enema (DCBE). The sensitivity of the two techniques is similar (Kewenter et al 1995), but colonoscopy is usually the preferred method. The problems with colonoscopy however are its high cost, complication rate and the inability to view the caecum in some cases.

Other possible screening tests are:

- Clinical examination and digital rectal examination (DRE), which is recommended as part of preventive health checks for the over-55 age group but is considered inadequate as a screening tool for colorectal cancer.
- Sigmoidoscopy, which has been reported in recent case-control studies to lead to reduction of 60–70 per cent mortality from cancer within reach of the sigmoidoscope, even if performed as infrequently as every five to ten years (Ahlquist et al 1989). Major clinical trials of sigmoidoscopy based screening are testing these findings (Atkin et al 1993; Gohagan et al 1994). A strong case can be made for implementing sigmoidoscopic screening as part of general health checks, but patient and practitioner compliance are uncertain (AHTAC 1997).
- Colonoscopy, which is the most effective tool for visualising and treating polyps, but is costly and carries a small chance of morbidity. Some advocate a single colonoscopy at age 55 to detect and remove polyps as the most effective way of ensuring a polyp-free colon, but there is no firm evidence of mortality reduction following this type of program.

Colorectal cancer is considered to show the greatest opportunities for mortality reduction of any cancer if a properly constructed screening program is introduced. A screening program based on FOBT in particular has the potential to be the most effective. The Australian Health Technology Advisory Committee (AHTAC) has undertaken a review of this issue and recommended commencing pilot FOBT programs for the average risk population aged 50 years or more (AHTAC 1997). Several feasibility projects on various aspects of screening have also been undertaken at State level.

Costs of screening

Economic literature on colorectal cancer screening reveals a wide range of cost-effectiveness estimates. Salkeld et al (1996) and Wagner et al (1996) have estimated, based on comprehensive studies, the screening costs as $25,700 and $18,826 per life year respectively.

Significant issues for the cost-effectiveness of colorectal cancer screening are the rate of diagnostic work-up, the cost of colonoscopy, and test sensitivity for cancer and significant adenomas (Irwig et al 1994; Salkeld et al 1996). The cost of the FOBT, the stage distribution of screen-detected cancers, and the cost of cancer treatment have minor impact on cost-effectiveness. The 95 per cent confidence interval for the Salkeld study, for example, was $13,539–$72,360, reflecting high variability of the estimates.

Treatment

The management of colorectal cancer is straightforward and well accepted. Surgical excision results in the cure of early stage colorectal cancer, although lymph node involvement at the time of surgery confers a poor prognosis with a five-year survival of about 30 per cent. Several clinical trials have shown an improvement in mortality rates using adjuvant chemotherapy in lymph node positive patients (IMPACT Investigators 1995).

Patients with distal metastases at the time of initial treatment rarely survive more than two years, and require treatment for palliation and reduction of tumour bulk. Chemotherapy, radiotherapy and a variety of interventional methods, including cryotherapy for liver secondaries, can all palliate the patient with advanced disease and modify the disease course.

There are some areas of controversy in relation to rectal cancer, where the place of adjuvant radiotherapy compared with total mesorectal excision is under trial, as is the utility of adjuvant chemotherapy. For colonic cancer, endoscopic resection is under trial.

Colorectal cancer — current status

- **Colorectal cancer is both common and costly. Each year there are about 10,000 cases diagnosed and about 4,500 deaths from the disease.**
- **Currently there is no national screening program for colorectal cancer. However, AHTAC has recommended commencing pilot programs for average risk Australians aged more than 50 years. There is *ad hoc* screening of high-risk groups such as those with a family history of colorectal cancer, and some State-based screening of average-risk groups.**
- **There is great potential for control of colorectal cancer through early diagnosis and a comparatively simple surgery, low morbidity and minimal community cost. Advanced disease cannot be cured and demands the use of complex and costly treatment. Prevention, screening and early detection programs need to develop alongside improved therapeutic interventions.**

2.6 Prostate cancer

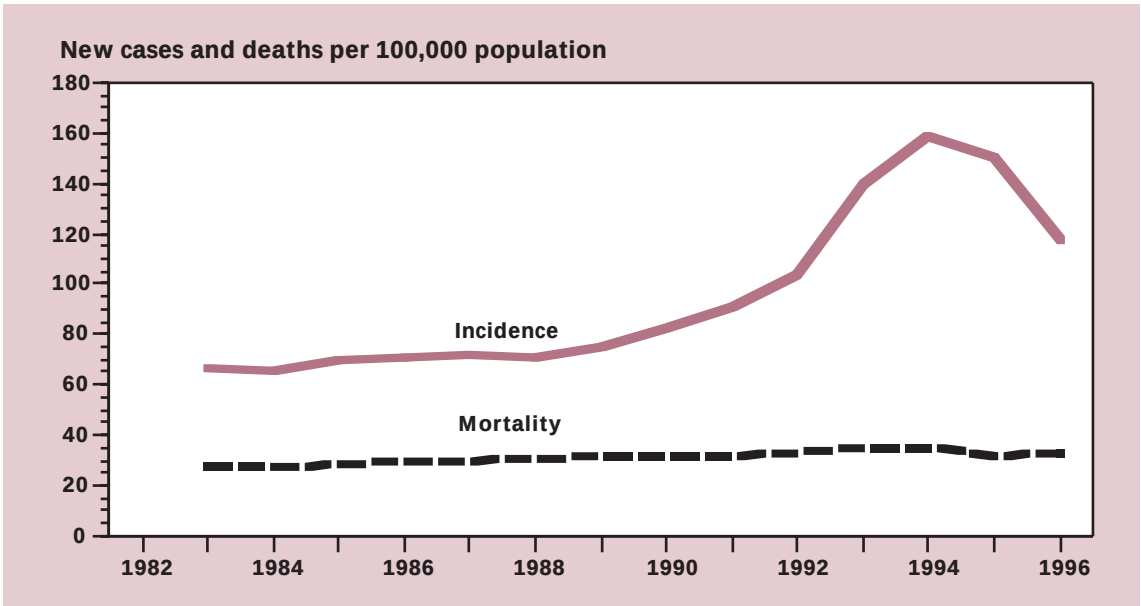
Epidemiology

Excluding non-melanocytic skin cancer, prostate cancer is now the most common cancer in Australian males, usually affecting men after the age of 55 years. Its reported incidence has risen rapidly since 1990, when prostate-specific antigen (PSA) testing, combined with ultrasonography and other investigations, was introduced widely. This testing indicates the presence of tumours in the prostate that would previously have remained undiagnosed in many cases. The introduction of this test had the effect of more than doubling the incidence rate between 1985 and 1994 (Figure 2.11).

There were 12,787 new cases diagnosed in 1994 (158.7 new cases per 100,000) accounting for 30 per cent of all new cancers in males (Table 2.12). However, semi-national data from four States for 1995 (150.5 per 100,000 males) and 1996 (117.1 per 100,000 males) indicate a sharp decline in reported incidence rates from the peak in 1994, reflecting a recent trend towards less widespread use of PSA testing.

Projections of incidence are problematic given the rapid changes in the rate over the past few years. If the current rate of PSA testing is maintained, it is estimated that by 1999 the incidence rate of prostate cancer will have reduced to 107.0 per 100,000 males (approximately 10,000 new cases) from the 1994 rate of 158.7 new cases per 100,000 males. Mortality rates, which reached a peak in 1993, are projected to fall at a relatively slow pace in comparison with incidence.

Figure 2.11 Prostate cancer — incidence and mortality trends



In 1996, there were 2,660 deaths from prostate cancer. Mortality from this cancer results in approximately 6,400 years of potential life lost before the age of 75 years. Five-year survival rates are around 66 per cent.

Table 2.12 Fast facts on prostate cancer

Australia	Males
New cases (1994)	12,787
Incidence rate (per 100,000)	158.7
Incidence trends (1990-94)	+17.9%pa
% all new cancers	30.0
Lifetime risk (0-74 years)	1 in 8
Deaths (1996)	2,660
Mortality rate (per 100,000)	33.1
Mortality trends (1990-96)	+0.6%pa
Potential years of life lost (0-74 years)	6,425
Lifetime risk (0-74 years)	1 in 66
Costs ($ '000) (1993-94)	95,372

Table 2.13 States and Territories — prostate cancer

State/Territory	1991–94 Incidence	1991–96 Mortality
	New cases and deaths per 100,000 population	
NSW	126.4	32.2
VIC	112.8	33.8
QLD	128.2*	34.1
WA	137.9	32.2
SA	129.1	33.8
TAS	140.9	38.1
ACT	124.8	41.4
NT	59.1	27.8

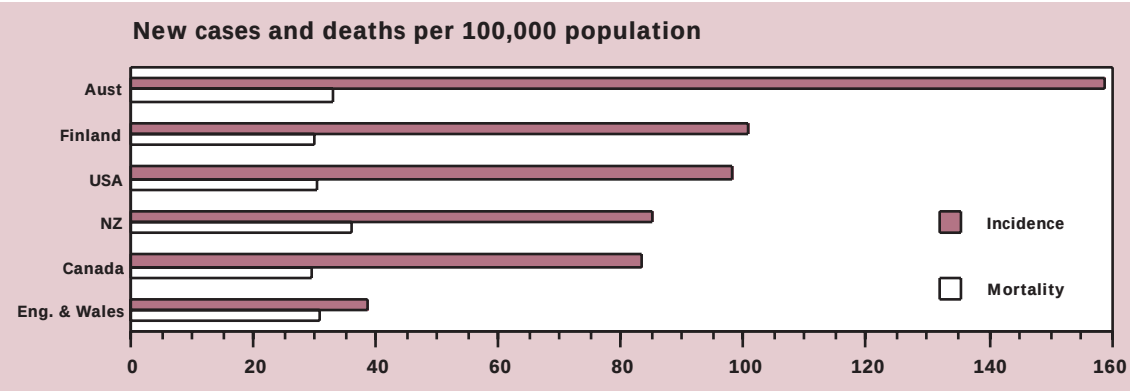
* Preliminary data.

There is limited variability between Australian States and Territories in prostate cancer incidence rates, apart from a slightly lower rate in Victoria (Table 2.13). Incidence rates for the Northern Territory are lower, but are subject to wide variability due to the relatively small size of the population.

National incidence and mortality data are not available for Indigenous males. Cancer registry data from Western Australia and the Northern Territory indicate that incidence rates may be six times lower in Indigenous males than non-Indigenous males. However, these data should be interpreted with caution as there is evidence of under-reporting of Indigenous status on cancer registries.

Australian-born males have prostate cancer mortality rates significantly higher than most migrant groups (Giles et al 1995).

Figure 2.12 International comparisons — prostate cancer



Note: Age-standardised rates for Australia (incidence—1994; mortality—1996) and other selected countries (incidence—1983–95; mortality—1993–94)

International prostate cancer incidence rates vary by a factor of 70 (Giles et al 1995). These incidence differentials suggest variation in PSA testing, rather than variation in prostate cancer rates. Of the countries compared in Figure 2.12, Australia has the highest incidence rate. However, the data for the USA, Canada and England and Wales are for the period 1983–87 and do not show increased incidence rates observed following the introduction of PSA testing.

Risk factors

Knowledge about risk factors for prostate cancer is poor. Currently the strongest known association is with age. Other possible risk factors include diet, body mass, physical activity, genetic factors and vasectomy, although there is no conclusive evidence.

Prevention and screening

There are currently no epidemiological data to define risk groups for targeted prevention or screening activities for prostate cancer.

The early detection and subsequent treatment of prostate cancer is a complex challenge that has received considerable attention over the past two decades, both in Australia and overseas. Evidence of any mortality reduction following early detection is equivocal; the role of population screening of asymptomatic men is therefore uncertain. The outcomes from current clinical studies are unlikely to become available for the next five to seven years.

There are two major randomised trials of prostate cancer screening underway (Gohagan et al 1995; Schroder & Bangma 1997). A major problem confronting these studies is the high level of PSA testing already present in recruits to the trial, requiring a large increase in sample size to show statistically significant changes in outcome. There are also likely to be significant differences between centres in the methods of recruitment, the number of screening modalities offered and the delineation of positive and negative tests.

There is continuing debate about screening for prostate cancer with DRE and PSA. There are no substantive data to support either view, and no assurance that the two major trials will be able to provide definitive evidence. Also, there is uncertainty about how PSA can be most effectively used in the detection of prostate cancer. Even proponents of mass screening do not recommend testing in men over 75 years of age, but studies of Australian practice show that significant numbers of men in this age group are being tested (Ward et al 1997; Pinnock et al, in press). Regardless of how the test is used, better information needs to be available to both men and general practitioners.

This point was highlighted in a recent AHTAC review of the issue (AHTAC 1996). AHTAC concludes that men without symptoms should not be screened for prostate cancer, and that 'men being offered or requesting the PSA test must be fully informed of the limitations of the available tests and the possible further diagnostic and treatment choices which they may face should they proceed with the test'. While there is uncertainty about the benefits of screening for prostate cancer, sufficient resources are needed to ensure that men are given the information they need. Last year, Antioch et al (1997) have updated the AHTAC review and supported its position.

Costs of *de-facto* prostate screening

Medicare statistics have been used to quantify patterns and trends in the use of the PSA test in Australia in the period 1992–96 (Bruce Armstrong, personal communication). Medicare statistics do not permit differentiation of PSA from prostate acid phosphatase tests, however the contribution of the latter is thought to be small. During 1992–1996, more than two million PSA and prostate acid phosphatase tests were reimbursed through Medicare in Australia, with more than one million Australian men tested (61 per cent of these had just one test, 10 per cent had more than three tests). Almost half of men aged 60–69 years had one or more PSA test.

The number and rate of PSA tests peaked in all age groups and all States and Territories (except the Australian Capital Territory) in 1995, and the age-standardised rate of men having one or more PSA test increased by 150 per cent from 1,829 per 100,000 men in 1992 to 4,571 per 100,000 in 1996. More than $10 million was spent on PSA and prostate acid phosphatase tests in 1996 through Medicare alone.

Economic evidence on cost-effectiveness of screening is sparse and is reliant on intermediate outcome measures and overseas data. The AHTAC review found that costs generated by adverse events associated with the diagnostic work-up, the therapeutic intervention or long-term surveillance may be significant.

The economic case for prostate cancer screening has not yet been well presented. Based on the public health significance of prostate cancer, it seems reasonable to support the recommendations of Antioch et al (1997) that Australian researchers should link in with the two large randomised controlled trials of prostate cancer interventions being undertaken in the USA and Europe and consider more carefully targeted screening strategies. The clinical usefulness, epidemiology and cost-effectiveness of prostate cancer screening may not be known for at least 10–15 years (Auvinen et al 1996).

Treatment

Controversy also exists as to the most effective treatment for prostate cancer.

Diagnosis and staging of prostate cancer

The driving force in the diagnosis of prostate cancer is the PSA level. An arbitrary cut-off point is used to decide which men should undergo biopsy. To increase accuracy, lower thresholds should be chosen to determine the need for biopsy, but this will result in a very significant rise in the rate of unnecessary biopsy and in the anxiety levels of men who have had a PSA test.

Management of prostate cancer is complicated by the fact that it is extremely difficult to adequately stage the disease and assess its biological activity before treatment begins. Approximately 60 per cent of men newly diagnosed with prostate cancer are believed to have organ-confined disease (Parker et al 1996), but pathological analysis following surgery reveals organ-confined disease in less than 50 per cent of cases.

To improve staging accuracy, nomograms have been developed that predict the probability of a patient having organ-confined disease. The use of these nomograms, when counselling men before radical prostatectomy, has increased the proportion of men with organ-confined disease opting for surgery from 33 per cent to 55 per cent (Partin et al 1997).

Treatment modalities

The three most frequently applied management strategies are watchful waiting, radiotherapy and radical prostatectomy. Watchful waiting is considered feasible for prostate cancer because of the generally slow progression of the disease and because of the side effects of radiotherapy and surgery. A wide range of outcomes for each of these treatment modalities may be expected. Some of the most favourable results are reported below, but the paucity of evidence from randomised trials compounds the difficulties that confront patient, urologist and oncologist alike, when deciding treatment.

Watchful waiting — A meta-analysis of watchful waiting has found 10-year disease-specific survival to be around 87 per cent. Eighty-one per cent of early stage (grade one) patients but only 26 per cent of later stage (grade three) patients were metastases-free at 10 years (Chodak et al 1994).

Radical radiotherapy — The metastases-free survival has been reported to be 90 per cent for grade one tumours, 65 per cent for grade two tumours, and 25 per cent for grade three tumours, eight years after diagnosis and treatment (Hanks 1991).

Radical prostatectomy — The five-year metastases-free survival has been reported to be 94 per cent for grade one tumours, 90 per cent for grade two tumours, and 73 per cent for grade three tumours, following this procedure (Gerber et al 1996).

All of these studies have attracted criticism for poor trial design. Currently, at least four randomised trials are underway in Europe and the USA to optimise treatment modalities. Recruitment is not easy for these trials, a point highlighted by the UK Medical Research Council (PRO6) trial. This study, launched in 1994, aims to

compare watchful waiting with radiotherapy and radical surgery, but by the end of 1995 was able to recruit only 21 men (MRC Working Party on Prostate Cancer 1994).

Nonetheless, a recent 10-year, population-based, retrospective study of approximately 60,000 men suggests that there is some definite benefit in moderately and poorly differentiated tumours, from treatment as opposed to non-treatment (Lu-Yao & Yao 1997).

Prostate cancer — current status

- **Prostate cancer is the most common cancer in Australian men and second only to lung cancer as a cause of cancer death among them. The incidence of the disease doubled between 1985 and 1994, when prostate-specific antigen (PSA) and other tests were introduced widely in Australia. Semi-national data up to 1996 however indicate a sharp decline in incidence since the 1994 peak.**
- **There is no evidence of any reduction in mortality following early detection of cancer in asymptomatic men. Current national policy is that men without symptoms should not be screened for prostate cancer.**
- **The optimum treatment for prostate cancer is subject to debate. The current trend is to adopt a watchful waiting approach in men aged over 75 years, particularly with low PSAs and low-grade tumours. Treatments such as radiotherapy or radical prostatectomy are being offered to younger men. This approach is seen by some as being a reasonable compromise until new evidence from randomised controlled trials becomes available.**

2.7 Other cancers

The priority cancers currently targeted offer good prospects for primary, secondary and tertiary preventive interventions, but the list is not exclusive and these are not the only cancer types which offer the best prospects for reduction in morbidity and mortality. Other cancer types may be considered in future NHPA processes.

Head and neck cancers are a major cause of morbidity and mortality, especially in males. Aetiologically, they are strongly associated with smoking and alcohol consumption, both amenable to behavioural change. The outcome of treatment of head and neck cancer is demonstrably superior when undertaken by expert multidisciplinary teams, providing a simple strategy for improvement of results.

Nasopharyngeal cancer has a strong genetic predisposition in South-East Asian people and a reasonable case could be made for screening Cantonese and Vietnamese ethnic groups, especially those with a family history of the disease. Cancers of the paranasal sinuses are associated with wood workers, and this disease could be largely prevented by protection against inhalation of wood dust.

Hepatocellular carcinoma is strongly linked to infections with hepatitis B and C, both of which are preventable diseases. It is also associated with alcoholic cirrhosis, which is again is equally amenable to prevention.

Oesophageal cancer is causally linked to smoking, and therefore partially preventable. New therapy protocols involving chemoradiation offer reduced morbidity and mortality compared with oesophagectomy.

Bladder cancer is another smoking-related cancer. Bladder conservation protocols using chemoradiotherapy show promise.

A significant proportion of anal cancers are due to HPV infection, which is sexually transmitted. The disease is largely preventable by safe-sex practices. Treatment of anal cancer has been revolutionised by chemoradiotherapy protocols which have largely eliminated the need for abdominoperineal resection.

Among gynaecological cancers, ovarian cancer is the largest cause of mortality. Recent discovery of predisposition genes offers the possibility of detecting those at highest risk for close monitoring by transvaginal ultrasound or Ca 125 serum marker levels.