



The control of melanoma in New Zealand

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Abstract

Aims This study estimated the impact of prevention, screening, early diagnosis, and treatment on the burden of melanoma in New Zealand.

Methods Cancer control plans and management guidelines were reviewed to identify activities that could reduce the burden of melanoma in New Zealand and an estimation was made of their effects on incidence and mortality. The base year for estimating changes in incidence and mortality was the published melanoma data for 2002.

Results The registration of melanoma increased from 1037 new registrations in 1993 to 1487 in 1994 and peaked at 1759 in 1995. In 2002 a further increase occurred, to 1842 new registrations and 235 deaths from melanoma. It is likely that 328 of the 1842 new cases of melanoma in 2002 were directly attributable to severe sunburn. A reduction of 10% in the number of people getting severely sunburnt could prevent 28 melanoma cases per year. If 2% of melanoma deaths occur in high-risk individuals, approximately 4 deaths per year could be prevented by surveillance of high-risk groups. Thin melanoma has a very good prognosis: a 10% shift in the depth distribution into the thinnest depth category would result in about 29 deaths from melanoma prevented each year.

Conclusions The best avenues for reducing the burden of melanoma in New Zealand are prevention of excessive sun exposure and early diagnosis. Reducing severe sunburn and diagnosing a greater proportion of melanomas when they are thin would have the greatest impact on the incidence of and mortality from melanoma.

The incidence and mortality rates of malignant melanoma have shown large increases in New Zealand over the past 30 years.^{1,2} Similar trends have also been observed in many other developed countries,^{3,4} but New Zealand and Australia still have the highest incidence rates in the world. While smaller increases in both incidence and mortality have been observed in people born after about 1950 in New Zealand, they have continued to increase for older people and in particular those aged over 60 years.⁵

Until the Cancer Registry Act 1993 came into force in New Zealand in July 1994, the Cancer Registry had been based primarily on public hospital records and so had missed many tumours excised outside hospital and many patients treated privately. Several studies⁶⁻⁸ have shown that incidence rates of melanoma estimated directly from pathology reports were considerably higher than was apparent from registered cases provided by the New Zealand Cancer Registry. Since the introduction of the Cancer Registry Act 1993, statutory notification has greatly increased the numbers of melanomas registered.

Multiple strategies will be required to combat the increasing burden of melanoma. A cancer control strategy encompasses all aspects of cancer: prevention, screening, early detection, diagnosis, treatment, rehabilitation, and palliative care. It also includes cancer surveillance and research.⁹ The results in this report focus on the likely effects of four different interventions (prevention, screening, early diagnosis and treatment) in reducing the burden of melanoma in New Zealand.

Methods

Cancer control plans and management guidelines, both from New Zealand and overseas, were reviewed to identify potential activities that could reduce the burden of melanoma in New Zealand. Their effects on the incidence of and mortality from melanoma in New Zealand were estimated.

Service provision depends on actual numbers of cases or deaths, not rates of disease or death, whereas comparisons over time or place require standardised rates of disease. Absolute numbers and age-standardised rates,^{10,11} standardised to Segi's world population, have been presented. Registration rates are used as the closest approximation to the national incidence rate available in New Zealand.

Estimates of projections in incidence and mortality have been used to estimate the future burden of disease. The projection models separately relate cancer incidence and mortality data to three time dimensions: age, period, and cohort.¹² Estimates of the future burden used the average projection from a set of models rather than relying on any individual model alone.¹²

The base year for the estimations of changes in incidence and mortality resulting from cancer control activities was the data published for 2002.^{10,11} The number of deaths prevented by cancer control activities has been calculated for 2002 as if the nominated interventions were already in existence. This, in effect, standardises their impact to the 2002 calendar year.

Life expectancy tables were used to calculate person-years of life lost from death due to melanoma.

Population attributable risk percent (PAR%) was calculated in the usual way:

$$\text{PAR\%} = \frac{P_e(\text{RR} - 1)}{P_e(\text{RR} - 1) + 1} \times 100$$

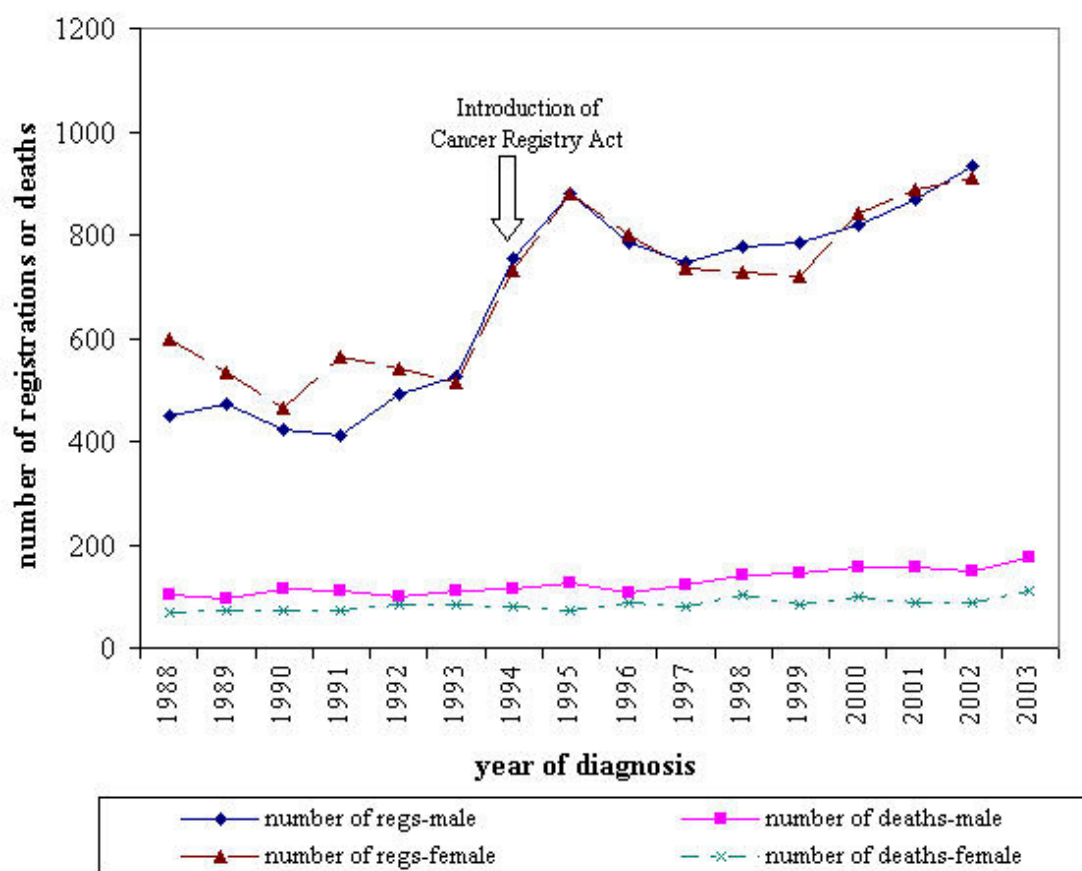
... where P_e = proportion exposed in the population and RR = relative risk for the exposure of interest. Further details of the methods are available in another report of this work.¹³

Results

Incidence and mortality—In 2002, melanoma accounted for 1842 new cancer registrations, of which 933 were in men and 909 in women (Figure 1). The registration of melanoma increased from 1037 new registrations in 1993 to 1487 in 1994 and showed a peak at 1759 in 1995 due to the effects of compulsory cancer registration. Registrations of melanoma then decreased in 1996 and 1997, but in 2001 and 2002 the numbers of registrations increased, to approximately the same level as in 1995 for women and slightly higher than in 1995 for men.

In 2002 there were 235 deaths from melanoma (Figure 1); 149 in men and 86 in women. In this year, death from melanoma accounted for 3.6% of all male cancer deaths and 2.3% of all female cancer deaths. Numbers of deaths from melanoma have increased since 2002, to 174 in men and 111 in women in 2003.

Figure 1. Melanoma registrations and deaths by year

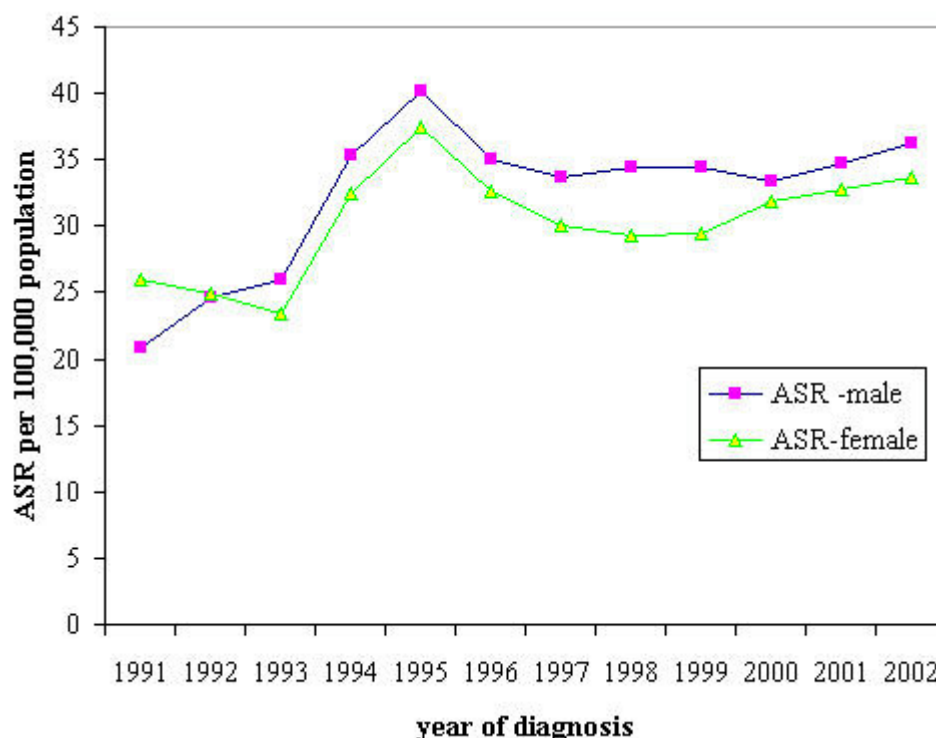


Age-standardised registration rates (ASR) for melanoma show a very similar pattern (Figure 2). ASRs peaked in 1995 (40.2 per 100,000 population for men and 37.5 per 100,000 population for women) after the introduction of the Cancer Registry Act, declined in the following few years and then recently have shown a slight increase. Prior to 1992, men had a lower registration rate than women, but since 1993, men have had higher age-standardised registration rates than women (Figure 2).

Melanoma is reasonably common in younger age groups with significant numbers of melanomas diagnosed between 25 and 39 years of age in both men and women (Figure 3). Melanoma is the commonest cancer in adolescence. In 2002, the greatest number of registrations in women occurred in those aged 45–49 years and in men occurred at 70–74 years of age. However, the highest age-specific rate for men occurred in those aged 85 years or more, and in women occurred in those aged 75–79 years. The average age at diagnosis in 2002 for men was 61.2 years and for women was 57.1 years.

Many deaths from melanoma occur at a younger age than for most other solid tumours, with the average age at death of 65.5 years for men and 66.7 years for women in 2002. In the same year, 2,354 person-years of life were lost for men and 1,573 person-years of life were lost for women due to melanoma.

Figure 2. Age-standardised registration (ASR) rates for melanoma by year



Melanomas were considerably under-registered before 1 July 1994 when the Cancer Registry Act 1993 came into force, so estimations of projections have used adjusted rates, where the adjustor was the average incidence to mortality ratio pre- and post-1994.¹² Between 2001 and 2011, the absolute number of registrations for men over the age of 15 was expected to increase by 32%, to 1,148 per year and the number of deaths was expected to increase by 17%, to 183 per year.¹²

When these calculations were made it was estimated that, for women over the age of 15 years, the absolute number of registrations would increase to 799 per year and the number of deaths was estimated to increase to 113 per year by 2011.¹² However, in 2002, melanoma registrations for women were already higher than the projection, at 909 new cases, and in 2003, deaths in women had almost reached the projection for 2011.

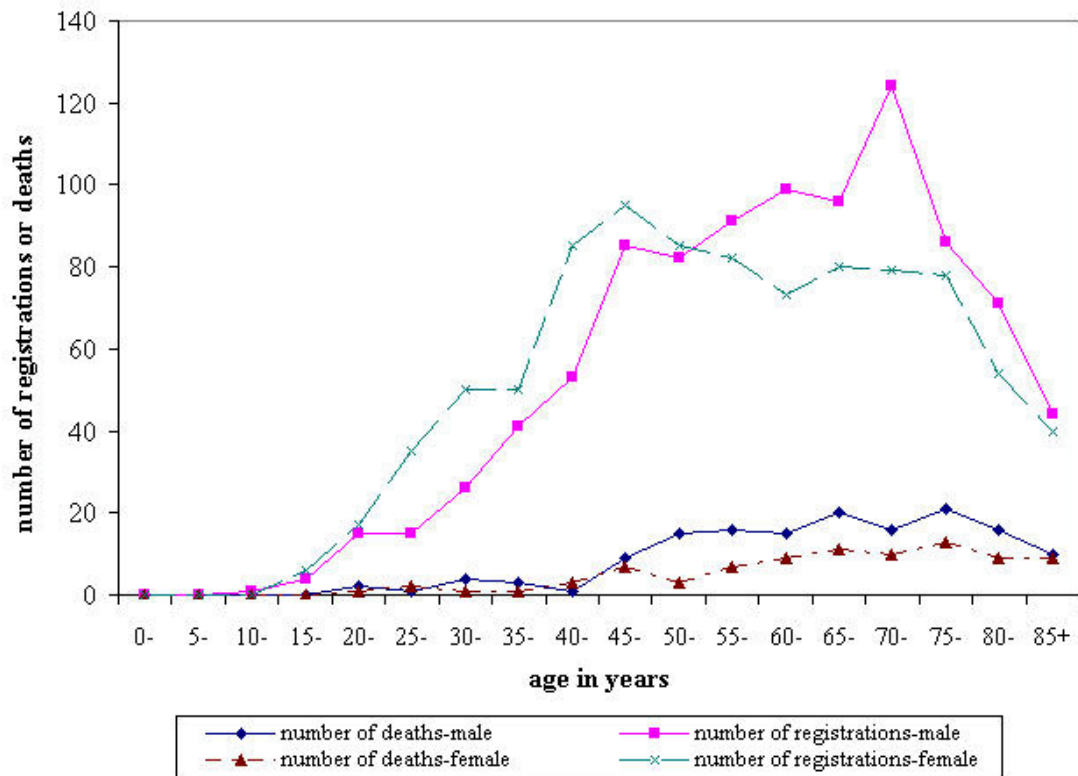
Cancer control activities—The estimated impact of cancer control activities for melanoma are summarised in Table 1.

Primary prevention—The main causal factor for the development of melanoma is exposure of the skin to ultra-violet (UV) light. Using the relative risk for ever versus never being sunburnt (with blisters) as 1.4, and the prevalence of ever being sunburnt (with blisters) as 54%,¹⁴ the population attributable risk per cent (PAR%) due to being sunburnt with blisters was 17.8%. So it is possible that 328 of the 1842 new cases of melanoma in 2002 were directly attributable to severe sunburn.

Table 1. Estimate of the potential for changes in the incidence of and mortality from melanoma

Components of cancer control		Change in incidence rate	Change in numbers of registrations per year	Change in mortality rate	Change in number of deaths per year
Primary prevention	Decrease UV light exposure – reduce number of severe sunburns	Decrease	28 new cases prevented	Decrease mortality	4 deaths prevented
Screening	Population screening Surveillance of high risk groups e.g. high-risk kindred	Increase Increase slightly	Increase Increase slightly	Not known Decrease mortality slightly if diagnosed earlier	4 deaths prevented
Early diagnosis	Survival depends on depth at diagnosis. Removal of thin melanomas means ~95% cure.	None		Decrease if 10% shift to ≤0.75mm depth category	29 deaths prevented
Treatment	Surgery	None		None predicted in the near future	
	Chemotherapy/Immunotherapy	None		None predicted in the near future	
	Radiation	None		None predicted in the near future	

Figure 3. Melanoma registrations and deaths by age, 2001



If severe sunburn (with blisters) in the population is decreased by 10%, to a prevalence of 48.6%, then the PAR% decreases to 16.3%. If we apply this PAR% to the 2002 incidence rate, 300 cases of melanoma could be directly attributable to severe sunburn. Thus a reduction of 10% in the prevalence of severe sunburn could result in approximately 28 fewer cases of melanoma per year. With a mortality to incidence ratio of 12.8% in 2002, this could result in a reduction of about 4 deaths from melanoma each year.

Screening—Population screening by skin examination has the potential to reduce mortality but there is currently no data to assess the potential benefits of population screening in New Zealand.

Surveillance (including screening by skin examination) of high-risk people is possible. If 80% of the melanomas that occur in high-risk individuals were found early enough to prevent death and we assume that 2% of melanoma cases and 2% of deaths occur in these individuals, approximately 4 deaths per year would be prevented by screening of high-risk groups. That is, about 1.6% of all deaths each year from melanoma.

Early diagnosis—Survival decreases with increasing melanoma depth, but melanoma has a very good prognosis (about 95% 10-year survival) for tumours less than 1 mm thick.¹⁵ Prognosis is poor for tumours thicker than 3.5 mm: the 5-year disease-free survival is less than 50%.¹⁶

In 1998 and 1999, approximately 50% of invasive melanomas in New Zealand were diagnosed at ≤ 0.75 mm. Using survival data from the USA¹⁷ and Australia¹⁵ (comparable figures for survival by depth in New Zealand are not available), if patients with melanomas diagnosed at ≤ 0.75 mm depth (the previous cut-off point for 'thin' melanomas) have a 10-year melanoma-specific survival rate of about 96% and an average survival rate of 64% for depths greater than 0.75mm, then a 10% shift in the depth distribution from >0.75 mm into the ≤ 0.75 mm depth category would result in about 29 deaths prevented per year, based on the melanoma registration figures for 2002.

Treatment—A reduction in death rate from improvements in treatment is possible but likely to be small in the near future. Surgical excision of early lesions is currently the main curative treatment for melanoma.¹⁸ Elective lymph node dissection is no longer recommended, and the value of sentinel node biopsy is currently still under investigation.^{19–21} There are as yet no adjuvant therapies of proven benefit for melanoma.^{19,21} Interferon- α treatment has been shown to increase disease-free survival but is also associated with severe side effects. Melanoma is usually responsive to radiation but only in certain circumstances is radiation the treatment of choice.

Discussion

Reducing the impact of melanoma in New Zealand requires a planned, systematic, and coordinated approach to multiple activities. Underpinning this approach is the requirement to collect information on incidence, prevalence, mortality, diagnosis, stage, and survival of melanoma patients.⁹ Research seeks to identify and evaluate means of reducing melanoma morbidity and mortality, and thus research is a fundamental element for the production of evidence needed for effective prevention and control of melanoma.

Prior to the Cancer Registry Act which made notification of cancer compulsory, many melanomas had not been notified to the Cancer Registry and this appears to have been greater for men than women. The system for registration of cancer in New Zealand prior to mid-1994 was a voluntary system, and notifications came predominantly from public hospitals. Thus, melanoma was considerably under-reported in New Zealand until 1995–1996 and the interpretation of trends over time is thereby restricted.

As expected, both the numbers of registrations of melanoma and the ASRs increased dramatically after the introduction of the Cancer Registry Act. However, in 1996, the rates declined, but not to pre-Cancer Registry Act levels. The reason for this decrease, which was greater in women, is not clear, although it appears that prevalent rather than incident cases were initially being registered in 1995. It is possible that before 1994, recurrences were registered as new cancers because of a failure to register the original diagnosis in earlier years.

After the Cancer Registry Act, recurrences were easier to identify because of more complete registration and thus less likely to be registered as incident cases. Since 1997, the registration rates in men have remained reasonably stable albeit with a suggestion of an increase in recent years, whereas the registration rates in women increased slightly in 2000, 2001 and 2002. Incidence rates of melanoma in both men

and women have also increased in Queensland²² and South Australia²³ from 1998 to 2002.

Cancer prevention should be a key element in all cancer control programmes; it is often the most cost-effective form of cancer control.⁹ The main aetiological factor for melanoma is exposure of Caucasian skin to ultra-violet (UV) light, particularly intermittent exposure and particularly during childhood. The best avenue currently for melanoma prevention is believed to be by encouraging protection against sunburn, particularly in children, and in fair-haired and fair-skinned people.¹⁸

The efficacy of sunscreens in reducing exposure to sunlight has not been proven. A randomised controlled trial (RCT) of sunscreen use and a review by the International Agency for Research on Cancer have shown that sunbathers often use sunscreen to extend their time in the sun, thus increasing their exposure to UV light and their risk of melanoma.^{24,25} Frequent sunbed use is also suspected of increasing the risk of melanoma.

Coordinated public health policies and comprehensive interventions are needed to encourage and support healthy environments.⁹ There is reasonable evidence that knowledge about skin cancer can be increased by health education and health promotion, but there is no evidence that sun exposure behaviour can be easily altered.^{18,26} Neither is there data to support the suggestion that health promotion of sun avoidance has substantially altered the incidence of melanoma.¹⁸

Even Australia, which has had comprehensive health promotion messages about skin cancer prevention for more than 30 years, shows little decrease in the incidence of melanoma, except possibly in younger women in New South Wales and Queensland.²⁷ Moreover, a recent Australian study²⁸ of adolescent sun exposure and sun protection behaviours showed a significant increase in sun exposure and sunburns from 1993 to 1999.

Melanoma meets many of the criteria of a cancer whose outcome could be improved by screening. Population screening by skin examination has the potential to identify a high proportion of people with early melanomas and reduce mortality by early treatment, but there is as yet no conclusive evidence of improvement in survival.^{18,29}

The efficacy of early detection or screening programmes for melanoma has not been tested by randomised trials anywhere in the world.³⁰ A systematic review of papers published between 1994 and 1999 on screening for skin cancer³¹ found no direct evidence that screening by physicians reduced morbidity or mortality from melanoma. Nevertheless, melanoma prevention and control programmes, including education campaigns and screening, have started in many other countries over the past decade although data on their effects are only beginning to be collected.³²

Organised population screening has not been introduced into Australia as there is little evidence for its survival benefit, and its cost-effectiveness is poor. A cluster RCT underway in Queensland, Australia, is investigating a community-based screening programme versus normal practice, but any effects on mortality may not be evident for 10 years.³³

Approximately 10% of melanoma patients in Australia had a first-degree relative who had had a confirmed melanoma.¹⁸ Many of these familial clusters will be due to chance, but about 2% of all melanoma cases occur in high-risk kindreds. Assuming

the same proportion in New Zealand, high-risk kindreds are thus relatively rare, so surveillance, including screening, of these high-risk individuals will (while of potential benefit to these individuals) make little impact on the overall burden of melanoma.

It is also important to educate health professionals and the public about early signs of melanoma and to encourage early presentation. Development of techniques of skin surface microscopy may help health professionals diagnose pigmented skin lesions early.³⁴ The recent decrease in mortality in younger cohorts in Australia³⁵ may be due to earlier presentation and improvements in early diagnosis.

Breslow thickness at diagnosis has decreased from the 1980–1986 to 1994–2000 time periods.^{36,37} However, about half the improvement in survival from melanoma was unexplained by the change in depth distribution.³⁶ There is no comparable data series yet available for New Zealand. However, in 1998 and 1999, only 50% of invasive melanomas in New Zealand were diagnosed at ≤ 0.75 mm depth (thin melanoma), whereas in South Australia between 1994 and 2000, 57.8% were thin at diagnosis.

Optimising survival and quality of life for patients with melanoma requires having access to treatments that (on the basis of current evidence) are known to provide the best outcomes.⁹ The use of guidelines, protocols, and interdisciplinary management of melanoma patients may achieve consistent treatment standards. Surgical excision of early lesions is currently the main curative treatment for melanoma.¹⁸ Melanomas < 1 mm deep are treated definitively by excision with a 1 cm margin.²¹ *In situ* tumours and those < 0.76 mm deep, and with no vertical growth phase, are commonly excised with a 0.5 mm margin or less.²¹ More recent guidelines^{19,20} have recommended that lesions up to 2 mm deep be excised with a 1 cm margin.

Elective lymph node dissection is no longer recommended.^{19–21} Although recommended by some groups^{19,20} to be carried out in specialist centres, the value of sentinel node biopsy is currently still under investigation. There are as yet no adjuvant therapies of proven benefit for melanoma.^{19,21} Interferon- α therapy has been shown to increase disease-free survival but is associated with severe side-effects.

The UK guidelines²¹ state there is no place for isolated limb perfusion whereas the Swiss guidelines¹⁹ and the European Society for Medical Oncology²⁰ recommend its use in specialist centres. Melanoma is usually responsive to radiation. It may be used for large unresectable lesions or for lentigo maligna in elderly frail patients, but it is not usually the first treatment of choice.

The number of melanoma cases and deaths from melanoma have been projected to significantly increase in the following years and there is evidence that the number of deaths in women have already exceeded the projections. If future mortality from melanoma in New Zealand is to be controlled, then it is important that a greater proportion of new cases are diagnosed when they are thin and when the chances of a complete cure are high.

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