Epidemiology of melanoma in situ in New Zealand: 2008–2012

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ABSTRACT

AIM: The incidence of melanoma in situ varies throughout the world. It is associated with excellent outcomes, however many of those untreated will go on to develop invasive melanoma with a worse prognosis. There is no previously published data on melanoma in situ (MIS) in New Zealand. Further information is needed to enable better understanding of the disease spectrum.

METHODS: De-identified data were obtained from the New Zealand Cancer Registry (NZCR) by way of computerised search for MIS diagnosis. A separate search was performed to identify all patients with invasive melanoma. World Health Organization standard population was used for calculating age standardised rates.

RESULTS: There was a trend to increasing cases of MIS, but a relative plateauing of invasive melanoma. The number of cases for MIS overtook invasive melanoma in 2012. Overall, men had a significantly higher incidence compared to women. Incidence rates varied markedly between different regions of the country.

CONCLUSIONS: This paper provides new information about the epidemiology of MIS in New Zealand and its relevance to clinical practice. Public education strategies may be beginning to show effect with the goal of increasing prevention and earlier detection and treatment to enable decrease in melanoma mortality.

Melanoma in situ (MIS) refers to melanoma that is confined to the epidermis. The incidence of melanoma in situ varies throughout the world as it does for invasive cutaneous melanoma. It is associated with excellent outcomes, the 10-year survival of 100% for those treated with adequate excision. Many of those untreated will go on to develop invasive melanoma with a worse prognosis.[1]

Worldwide, incidence of invasive melanoma and melanoma in situ continued to increase during the 20th century but there is suggestion that it may be stabilising in the early 21st century.[1–7] It is hoped that prevention programmes initiated in the past will result in a decrease in incidence in the next 10–20 years.

Relative rates of MIS compared to invasive melanoma have been increasing with the postulate that this is because of earlier detection programmes. Australia and New Zealand have the highest rates of melanoma in the world.[7–9]

There is no previously published data on melanoma in situ (MIS) in New Zealand. Further information is needed to allow comparison to similar information on invasive melanoma and lead to better understanding of the disease spectrum.

Methods

This research was registered and approved with the local ethics group. De-identified data were obtained from the New Zealand Cancer Registry (NZCR) by way of computerised search for MIS diagnosis. Inclusion criteria were all cases of MIS from NZCR files over a five–year period from 2008 to 2012.Exclusion criteria were incorrect or absent information, overseas residence, benign naevi and invasive melanoma. Only one diagnosis was allowed per patient per year to avoid duplication.

A separate search was also performed to identify all patients with a first diagnosis of invasive melanoma over the same time period.

Table 1: Total number of cases of melanoma in situ and invasive melanoma in New Zealand 2008–2012.

Diagnosis year	MIS cases	Invasive melanoma cases
2008	2,007	2,264
2009	2,039	2,212
2010	2,263	2,347
2011	2,220	2,206
2012	2,346	2,325
Total (2008–2012)	**10,879**	**11,354**

The populations projected by Stats NZ were used as the population at risk for each year.[1] World Health Organization standard population was used for calculating age standardised rates (ASR). Life table data were used to estimate lifetime risk. Age standardised rate and its 95% CI were calculated. Negative binomial regression and Poisson regression models with adjustment for overdispersion were run. Sex difference in the incidence rate of MIS was tested using negative binomial regression models stratified by age groups. SAS 9.3 was used in the statistical analysis.

Results

There were 10,879 cases of MIS and 11,354 cases of invasive melanoma diagnosed in New Zealand for the years 2008–2012 (Table 1 and Figure 1). There was a trend to increasing cases of MIS, but a relative plateauing of invasive melanoma. The number of cases for MIS overtook invasive melanoma in 2012.

For MIS, females made up 46.5% (5,059). The median age of women at the time of diagnosis was 61 years (14–99 years) and it was 66 years for men (15–96 years). The majority of the cases (98.6%) were European. District health board (DHB) showed Canterbury and Waitemata DHB accounted for more than 25% of the total cases (Table 2).

The age standardised rate (ASR) is shown in Figure 2.

There was an increase in incidence of MIS over the study period but this was not statistically significant (P=0.097). Overall, men had a significantly higher incidence compared to women.

Figure 1: Total number of cases of melanoma in situ and invasive melanoma in New Zealand 2008–2012.

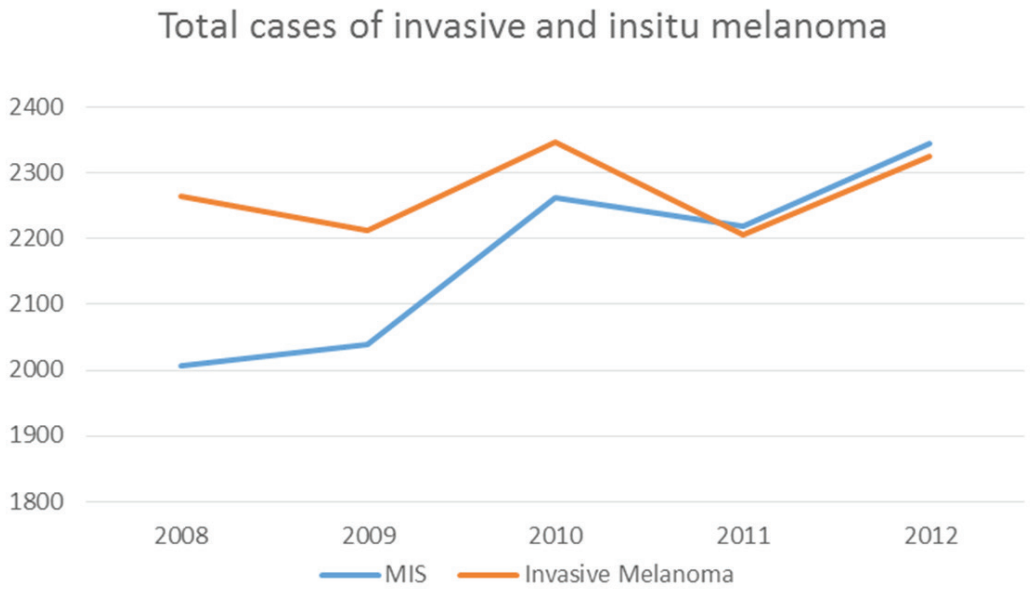

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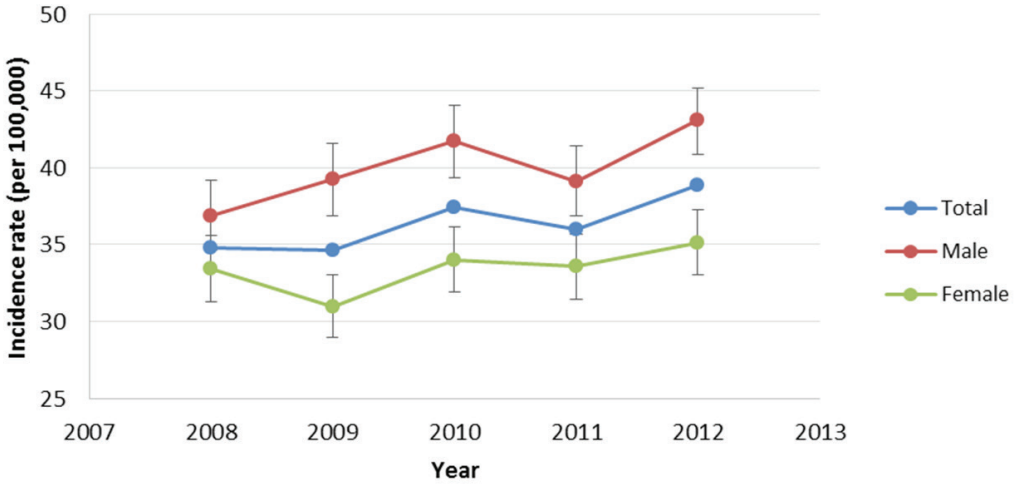
Table 2: General characteristics of the patients with melanoma in situ in New Zealand 2008–2012.

Characteristics		Number of cases	Proportion (%)
Diagnosis year	2008	2,007	18.45
	2009	2,039	18.74
	2010	2,263	20.81
	2011	2,220	20.66
	2012	2,346	21.37
Gender	Female	5,059	46.54
	Male	5,820	53.46
Ethnicity	Māori	135	1.19
	Pacific Island	8	0.07
	Asian	15	0.13
	European	10,727	98.61
DHB	Auckland	826	7.91
	Bay of Plenty	979	9.37
	Canterbury	1,409	13.17
	Capital and Coast	272	2.6
	Counties Manukau	782	7.49
	Hawkes Bay	458	4.39
	Hutt Valley	121	1.16
	Lakes	236	2.26
	MidCentral	646	6.19
	Nelson Marlborough	453	4.34
	Northland	296	2.83
	South Canterbury	201	1.92
	Southern	511	4.89
	Tairawhiti	224	2.14
	Taranaki	285	2.73
	Waikato	831	7.96
	Wairarapa	158	1.51
	Waitemata	1,365	12.55
	West Coast	84	0.8
	Whanganui	395	3.78

Figure 2: Melanoma in situ incidence rate (ASR, per 100,000) in New Zealand by year (2008–2012).



However, in the younger age groups (<60 years old), women had a higher rate of MIS than men (P<0.0001), whereas men's rate was higher in the older age groups (P<0.0001, see Figure 3).

There was a significant difference in the incidence rate (ASR, per 100,000) between women and men for each body region (Figure 4). Men had higher rates than women in 'head/neck' (12.9 vs 7.7, p<0.001) and 'trunk' (14.6 vs 7.0, p<0.001), while women had a higher rate than men in 'limbs' (17.6 vs 11.4, p<0.001). Poisson regression models were also run indicating gender and body region were significant factors affecting the incidence rate, after adjusting for age group.

Overall, 31% of MIS lesions were located on the head and neck regions, 29% on the trunk and 40% on the limbs regions.

The national incidence rate (ASR) was 35.4 per 100,000 (95%CI: 34.7, 36.1) for the time period of 2008–2012 (Figure 5). Incidence rates varied markedly between DHBs with Whanganui having the highest (86.2 per 100,000) and Hutt Valley having the lowest (12.2 per 100,000).

Discussion

There has been statutory notification of cancer in New Zealand since 1994 and thus the data reported here appears valid. However, there is always potential for

Figure 3: Melanoma in situ incidence rate (per 100,000) by age group in New Zealand.

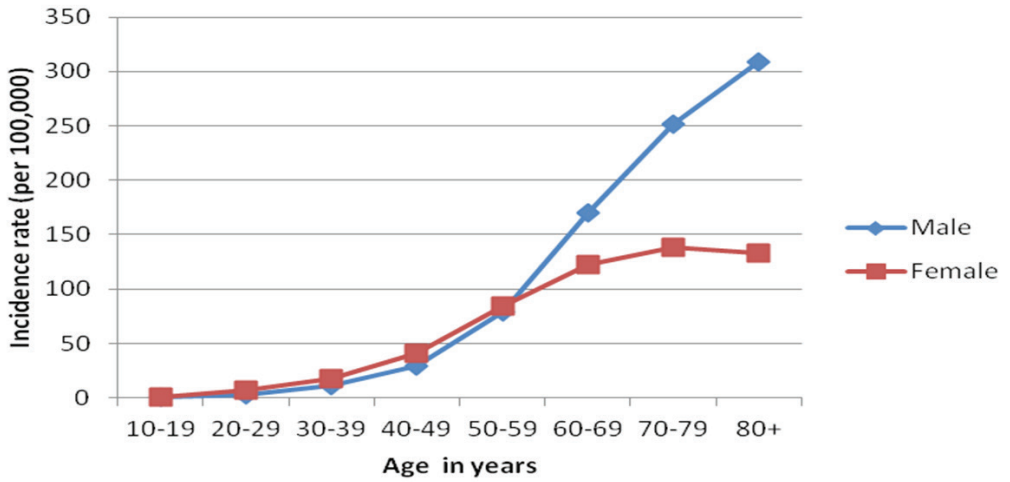


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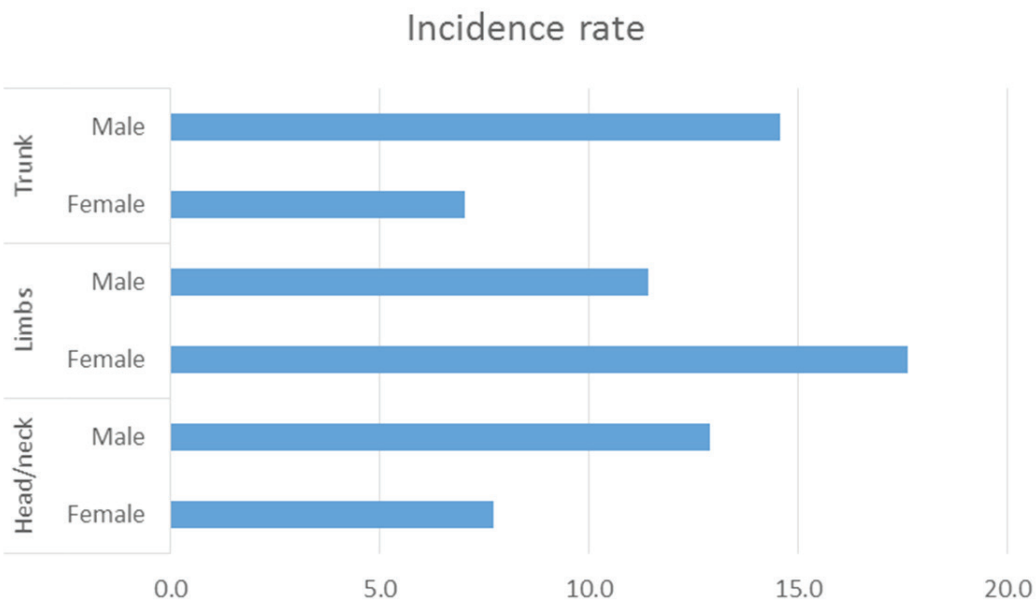
Figure 4: MIS incidence rate (ASR, per 100,000) by body region and gender over five years.



incomplete reporting of the diagnosis or pathological overcalling or undercalling of lesions, eg, dysplastic naevus versus MIS. It is possible that some pathologists are unaware of the mandatory reporting of MIS to the NZCR.

Those of European ethnicity made up 98.6% of cases, though they account for only 67% of the population. This is similar to that of invasive melanoma previously reported,[7] confirming that MIS and invasive melanoma are a major problem for people

Figure 5: Melanoma in situ incidence rate (ASR, per 100,000) by DHB in New Zealand.

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of European descent. The true incidence rates are obscured by using the WHO age standardisation but allows for international comparison.

The median age at diagnosis was 61 years for women and 66 for men. While no direct comparison can be made, this appears to be somewhat older than previously reported rates of MIS in Australia, 51 and 56 years respectively.[3]

MIS incidence rates continued to increase over the five-year period of the study, while the incidence of invasive melanoma may be plateauing. Total MIS cases overtook invasive melanoma cases in 2012. Previously published rates for MIS and invasive melanoma had shown large increases in rate over time.[4–6] It may well be that public education programmes that have been ongoing for at least 30 years are beginning to show population effects with earlier detection of lesions as MIS rather than invasive melanoma. However, there may also be an increasing false positive rate for dysplastic naevi being overdiagnosed as MIS.[2]

Preventative measures may also be contributing to stabilisation of invasive melanoma rates and hopefully decreases in the future.[11]

Older males remain the highest risk group with twice the incidence compared to females beyond age 70. This is consistent with previous reports of MIS and invasive melanoma.[3,7–9,12,13]

Incidence rate by body region demonstrated men had significantly higher rates than women in 'head/neck' and 'trunk', while women had a significantly higher rate than men in 'limbs'. This is consistent with previous reports of both MIS and invasive melanoma.[5,7]

There was quite marked variation between incidence in different geographical regions as defined by DHB catchment areas. Canterbury and Waitemata DHBs had the highest overall numbers of cases in Table 2, though this is likely because these DHBs have the highest populations.[10] This is reflected in the incidence rates by DHB in Figure 5 which show Canterbury and Waitemata have similar incidence rates, whereas eight other DHBs to have higher incidence rates despite lower overall numbers of cases.

The explanation for these differences may be due to incomplete reporting of MIS to the New Zealand Cancer Registry if there is misunderstanding to report only invasive melanoma rather than MIS (even though MIS reporting is mandatory).

The other possibilities include more access to skin cancer professionals in certain regions of New Zealand, variations in ethnicity and the different UV environments over the wide latitude spread in New Zealand. Though once again Whanganui has the highest incidence of MIS and invasive melanoma in New Zealand.

The national incidence rate (ASR) for MIS in New Zealand is approaching 39/100,000. This is similar, although slightly higher than MIS rates in Australia (approaching 37/100,000), which seems to be demonstrating a decline in melanoma incidence due in part to successful sun awareness programs.[3,13] These rates are much higher than those reported in other countries in the world such as the US (14/100,000)[14] and Sweden (10/100,000),[15] which have an incidence of less than half that in New Zealand.

For MIS in New Zealand the lifetime risk for men was 6.0% and 4.6% for women during 2008–2012. The invasive melanoma risk is 7.7% for men and 5.6% for women.[7] This gives a lifetime risk in New Zealand for melanoma (in situ and invasive disease) of 13.7% in men and 10.2% in women. There were 324 deaths from melanoma in 2012 in New Zealand.[16]

The reasons for New Zealand having the highest rates of MIS and invasive melanoma in the world are thought to include a fair-skinned population living at unusual latitudes, the ozone hole (although this is predicted to regenerate by 2050), intermittent sun exposure due to inclement weather patterns and lack of pollution (which absorbs UV radiation). We predict MIS incidence will continue to overtake invasive melanoma. Public education strategies may be beginning to show effect as well as doctors upskilling in knowledge and techniques such as dermoscopy and best skin cancer management.

Conclusion

This paper provides new information about the epidemiology of MIS in New Zealand and its relevance to clinical practice. This study suggests that while the rate of MIS is rising and the rate of invasive melanoma may be plateauing, it is hoped that this will eventually translate into lower melanoma mortality rates as melanomas are diagnosed at an earlier stage (thinner Breslow thickness and in situ disease). Prevention, awareness and early diagnosis must continue to be emphasised so that more MIS or thin melanomas are diagnosed and treated, allowing the mortality from melanoma to decrease.

Competing interests:
Nil.

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