

The association between melanoma Breslow thickness and long-term patient survival: an Australian population-based analysis

Serigne N. Lo^{1,2}, Gabrielle J. Williams¹, Anne E Cust^{1,3}, Alexander H.R. Varey^{1,2,4}, Sydney Ch'ng^{1,2,7}, Richard A. Scolyer^{1,2,5,6}, John F. Thompson^{1,2,7,8}

¹Melanoma Institute Australia, The University of Sydney, North Sydney, NSW, Australia; ²Faculty of Health and Medicine, The University of Sydney, Sydney, NSW, Australia; ³The Daffodil Centre, The University of Sydney, a joint venture with Cancer Council NSW, Sydney, Australia; ⁴Department of Plastic Surgery, Westmead Hospital, Sydney, NSW, Australia; ⁵Tissue Pathology and Diagnostic Oncology, Royal Prince Alfred Hospital and NSW Health Pathology, Sydney, NSW, Australia; ⁶Charles Perkins Centre, The University of Sydney, Sydney, NSW, Australia; ⁷Department of Melanoma and Surgical Oncology, Royal Prince Alfred Hospital, Sydney, NSW, Australia; ⁸Faculty of Health and Medical Sciences, The University of Western Australia, Perth, WA, Australia



Background

The prognosis of a patient with a primary cutaneous melanoma is known to be related to its **Breslow thickness**. Thickness is categorised to guide patients' management according to the internationally-accepted melanoma staging system published by the American Joint Committee on Cancer (AJCC) and endorsed by the International Union Against Cancer (UICC). This system is updated periodically, most recently with publication of the 8th Edition of the AJCC staging manual.

Objectives

- This study aimed to determine the **long-term** (30-year) relationship between Breslow thickness and survival outcomes.
- To assess the relative effect of a 0.8mm **Breslow thickness** threshold with respect to the incidence of both melanoma-related and non-melanoma-related death.
- The association between the risks of melanoma-death and non-melanoma death for **each 0.1mm increase** in Breslow thickness from 0.1mm to 1.0mm was described.

Methods

- **Registry data** for all Australians diagnosed with **thin invasive primary melanomas** between 1982 and 2014 were analysed.
- The cohort consisted of data for **210,042** patients including **144,447** patients with thin (**≤1.0mm** in thickness) melanomas.
- The primary outcomes included: incidence of **melanoma-related death**, incidence of **non-melanoma-related death**, **melanoma-specific survival (MSS)** and **overall survival (OS)**.

- The **Kaplan-Meier** method and **cumulative incidence function curves** were used to describe outcomes.
- **Multivariable Fine & Gray model¹** and a **Cox model²** were simultaneously performed.
- **Subgroup analyses** were conducted for **sex**, **age** (18-25 years, 26 to 50 years, 51 to 75 years and >75 years), and **anatomic site** (head & neck, trunk, lower limb, and upper limb).

Results

Figure 1: Melanoma-Specific Survival stratified by T-category

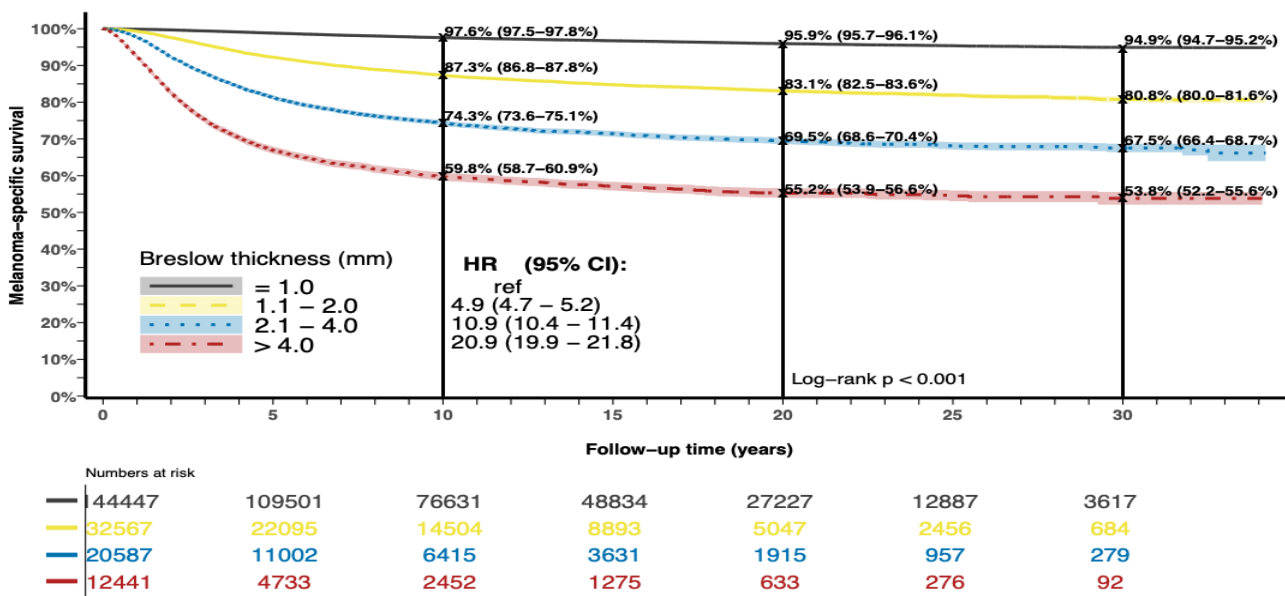


Figure 2: Cumulative Incidence function of Melanoma-related death stratified by T-category

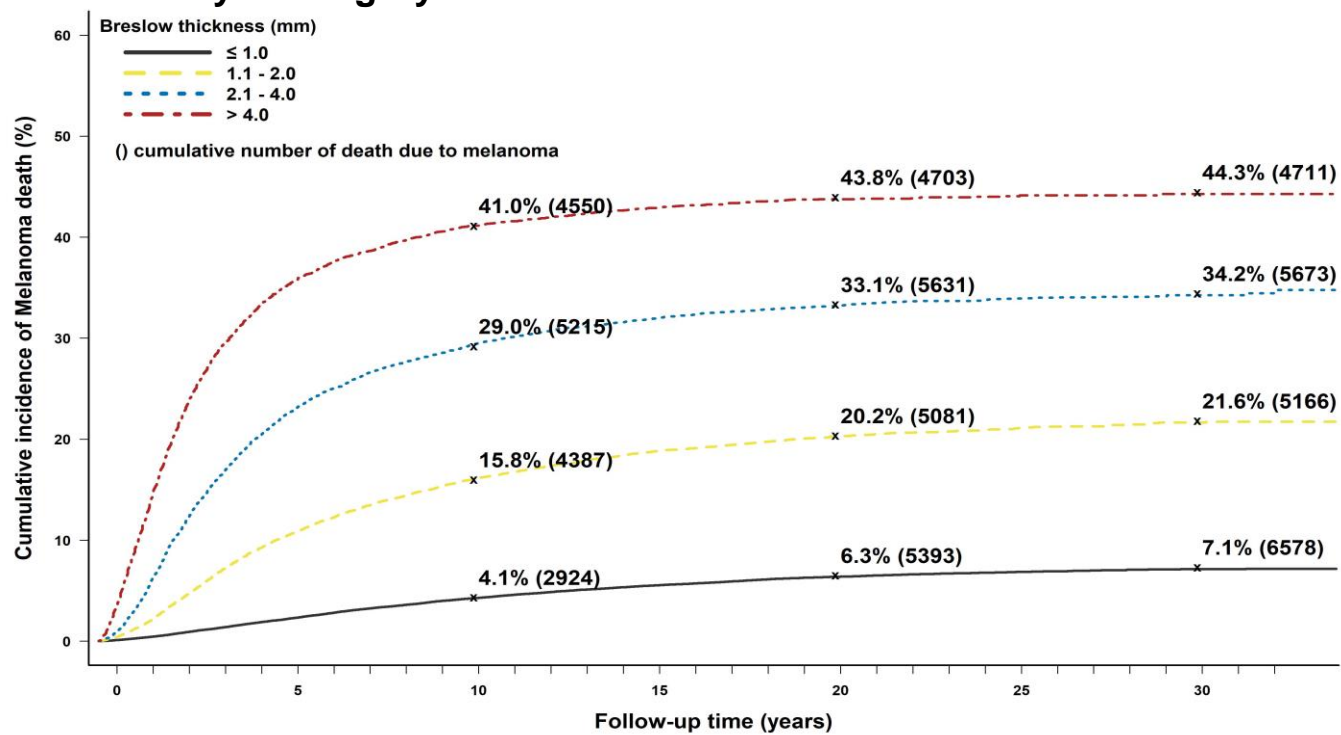
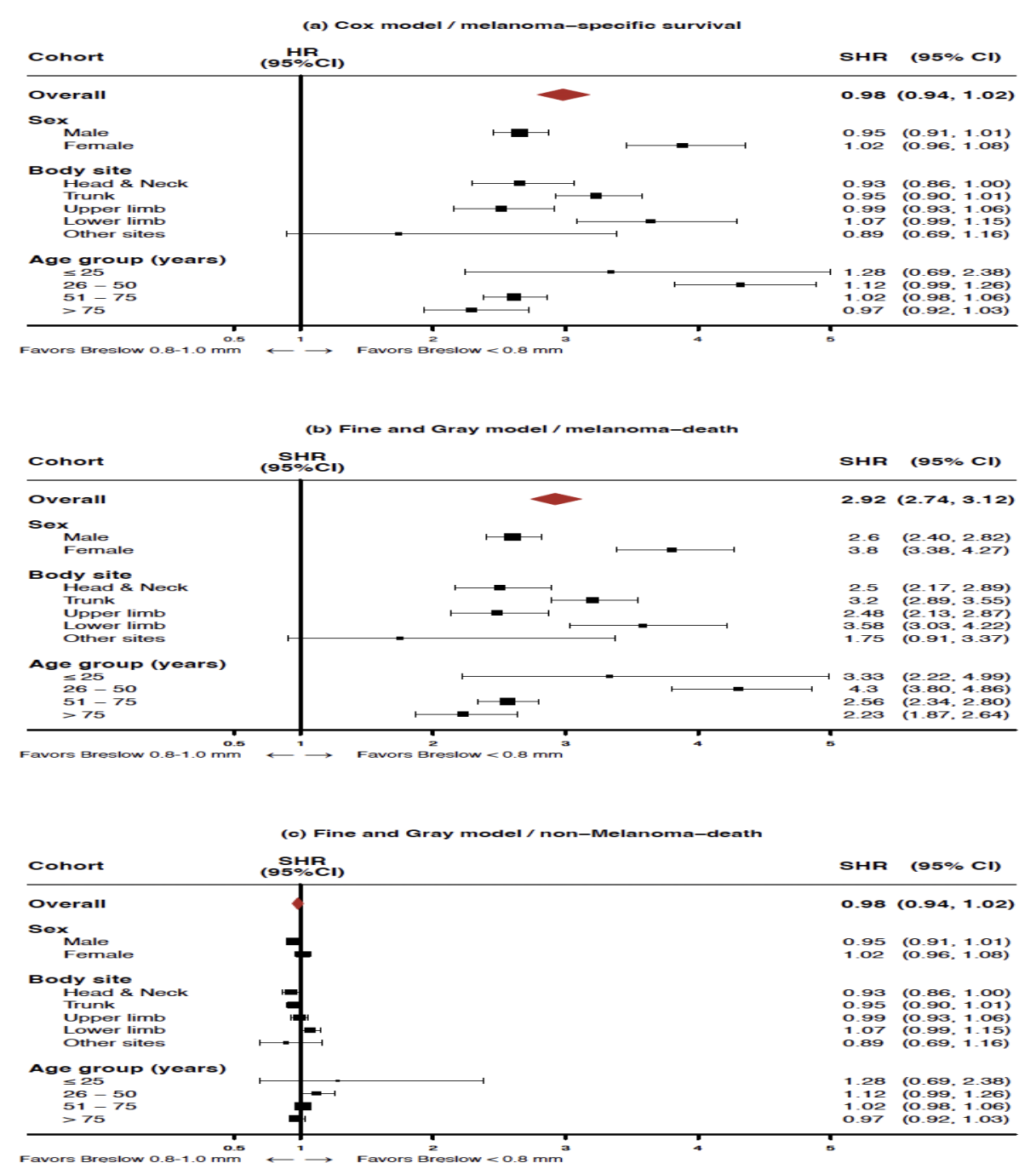


Figure 3: Effects of a 0.8mm threshold (overall and subgroup) on: (a) MSS, (b) melanoma-death and (c) non-melanoma-death



Conclusions

- ❖ A plateau in melanoma-related deaths occurred in T4 patients after 20 years but there were ongoing melanoma-related deaths for the other T-categories beyond 30 years.
- ❖ A progressive rise in the risk of death from other causes occurred across all T-categories.³

- ❖ The risk of melanoma-related death **increases significantly** for patients with primary tumors **0.8-1.0mm** in thickness.
- ❖ The risk of death from non-melanoma causes was similar across Breslow thicknesses of 0.1 to 1.0mm.
- ❖ This analysis confirms the importance of a 0.8mm threshold for guiding the care of patients with thin primary melanomas.⁴

References

1. Fine, J.P. and R.J. Gray, *A proportional hazards model for the subdistribution of a competing risk*. Journal of the American statistical association, 1999. **94**(446): p. 496-509.
2. Cox, D. and D. Oakes, *Analysis of survival data*. 1984.
3. Lo SN, Williams GJ, Cust AE, Varey AHR, Md SC, Scolyer RA, Thompson JF. Long-Term survival across Breslow thickness categories: Findings from a Population-Based study of 210,042 Australian melanoma patients. J Natl Cancer Inst. 2024 Sep 9:djiae198. doi: 10.1093/jnci/djiae198. Epub ahead of print. PMID: 39245462
4. Lo S.N., Williams G.J., Anne E Cust A.E., Ollila D.W., Varey A.H.R., Ch'ng S., Scolyer R.A., Thompson J.F. (2024), "Risk of death due to melanoma and other 1 causes in patients with thin (T1) cutaneous melanomas: competing- risk analysis of a large, population-based cohort", JAMA Dermatology

Acknowledgements

We thank the AIHW and the following data custodians for the release of their data: Australian Capital Territory Cancer Registry, Northern Territory Cancer Registry, Queensland Cancer Registry, South Australian Department for Health and Ageing, Tasmanian Cancer Registry, Victorian Cancer Registry, and WA Cancer Registry. This research was completed using data from the Cancer Data Linkage (CanDLe) Initiative. The CanDLe Initiative is led by Cancer Institute NSW and supported by the NSW Ministry of Health. Record linkage was provided by the Centre for Health Record Linkage, Cause of Death Unit Record File (COD URF) was provided by the Australian Coordinating Registry for the COD URF. Record linkage on behalf of the NSW Registry of Births, Deaths and Marriages, NSW Coroner and the National Coronial Information System. Support from Melanoma Institute Australia, The Cameron Family Foundation and The Ainsworth Foundation is also gratefully acknowledged. Finally, the authors thank colleagues and support staff at their respective institutions for their generous assistance.

