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Original Research

# Improved stratification of pT1 melanoma according to the 8th American Joint Committee on Cancer staging edition criteria: A Dutch population-based study

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**Abstract** ***Introduction:*** The 8th American Joint Committee on Cancer (AJCC) staging edition includes revisions regarding pT1 melanomas. We aimed to evaluate the expected impact of this edition on staging and survival in the Dutch pT1 melanoma population.
***Methods:*** In total, 32,935 pT1 melanoma patients, whose data were retrieved from the Netherlands Cancer Registry between 2003 and 2015, were included in the study. Patients were stratified by the 6th AJCC edition (cohort 1: 2003–2009) and 7th edition (cohort 2: 2010–2015) and all reclassified according to the 8th edition. Stage migration, sentinel lymph node biopsy (SLNB) positivity rates and relative survival were analysed. Agreement between staging systems was calculated by Cohen's kappa coefficient.
***Results:*** In cohort 2, restaging according to the 8th edition led to an increase of 7% in the total number of patients staged pT1b. The kappa score for agreement between the 6th and 8th edition was 0.15 and 0.25 for agreement between 7th and 8th edition. Restaging according to the 8th edition resulted in a higher SLNB positivity rate for pT1b patients than pT1a patients (8% versus 5%, $p = 0.08$). Relative survival curves were predominantly similar between the staging editions.

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***Conclusions:*** Implementation of the 8th AJCC staging edition will presumably not have major impact on the total number of Dutch pT1b patients. Consequently, the number of patients eligible for SLNB would roughly remain similar. In terms of SLNB positivity, the selection of high-risk pT1 melanoma patients is likely to improve. In addition, the 8th edition criteria for pT1 melanoma seem more workable for pathologists.


## 1. Introduction

Melanoma is the major cause of skin cancer–associated mortality, and its incidence has been rising sharply in the past decades, worldwide and in Europe [1–5]. The majority of newly diagnosed melanomas (up to 70%) are thin melanomas which generally have good prognosis but paradoxically, they do cause approximately 29% of melanoma deaths in absolute terms [6–11].

Accurate classification of melanoma patients into different disease stages is essential, both for prognostic assessment and guidance for patient management decisions. The tumour-node-metastasis classification for melanoma according to the American Joint Committee on Cancer (AJCC) staging system is used most often and has been internationally accepted [12–15]. Recently, the 8th AJCC staging edition has been introduced, which will be implemented in the Netherlands in 2018. Revisions include criteria regarding the pT1a and pT1b classification. According to the revised edition, melanomas with a Breslow thickness of <0.8 mm without ulceration will be classified pT1a, and melanomas with a Breslow thickness of ≥0.8–1.0 mm or a Breslow thickness of <0.8 mm with ulceration will be classified pT1b [16].

The sentinel lymph node biopsy (SLNB) technique that was developed to enable further nodal staging is not routinely recommended in these thin melanomas [17,18]. It is recommended in only a subset of patients with thin melanoma who have a higher risk of SLNB positivity and worse prognosis [13,15,19,20]. Previous studies have shown that not only Breslow thickness is one of the most important prognostic factors, but also ulceration, Clark level and mitotic rate are also important prognostic indicators for both positive SLNB and survival [12,17,20].

The Dutch melanoma guidelines (published in 2012) recommend SLNB for patients with stage IB melanoma or higher, which includes pT1b melanoma, to optimise staging and provide relevant prognostic information [21]. These recommendations were based on the 7th AJCC staging edition, where pT1b patients are those with a Breslow thickness of ≤1.0 mm with ulceration or mitoses ≥1/mm$^2$. The aim of this study was to evaluate the expected impact of the implementation of the 8th edition on staging, SLNB positivity and survival in the Dutch melanoma population focussing on the pT1 stadium compared with the 6th and 7th AJCC editions.

## 2. Patients and methods

### 2.1. Study population

This study included all pT1 melanoma patients diagnosed between 2003 and 2015 whose data were retrieved from the Netherlands Cancer Registry (NCR), embedded within the Netherlands Comprehensive Cancer Organisation [1]. The NCR is annually linked to the Municipal Personal Records database to retrieve information regarding vital status, which has been updated till January 1st 2017. Data on gender, age at diagnosis, year of diagnosis, Breslow thickness, mitotic rate, pT classification, SLNB, lymph node dissection (LND), the number of removed and positive lymph nodes and vital status were retrieved.

Between 2003 and 2009, data on SLNB were not accurately recorded due to applied registration methods. LND data sometimes overruled the SLNB data. Before 2010, these methods were altered, thus from 2010 onwards data on SLNB were separately recorded and therefore accurate.

### 2.2. Staging

Patients diagnosed between 2003 and 2009 were classified according to the 6th AJCC staging edition (pT1a: Breslow thickness ≤ 1.0 mm and Clark level II or III without ulceration; pT1b: Breslow thickness ≤ 1.0 mm and Clark level IV or V or present ulceration) and were regarded as cohort 1. Patients diagnosed between 2010 and 2015 were classified according to the 7th AJCC staging edition (pT1a: Breslow thickness ≤ 1.0 mm without ulceration and mitosis <1/mm$^2$; pT1b: Breslow thickness ≤ 1.0 mm with ulceration or mitoses ≥ 1/mm$^2$) and were regarded as cohort 2.

All patients were restaged according to the 8th AJCC staging edition (pT1a: Breslow thickness <0.8 mm without ulceration; pT1b: Breslow thickness ≥0.8 mm or Breslow thickness <0.8 mm with ulceration). Decimal values in the hundredth's place were rounded down in those ending in 1 to 4 (e.g. 0.74 mm was recorded as 0.7 mm) and rounded up to those ending in 5 to 9 (e.g. 0.75 mm was recorded as 0.8 mm). Ulceration status is not registered by the NCR. Since 2010, mitotic status was registered, which made it possible to derive the

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