2010 TNM Staging System for Cutaneous Melanoma

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The staging system for cutaneous melanoma is undergoing changes. Large studies have shown that the Clark level is not a statistically significant predictor of survival outcome for T1 melanoma patients, but that mitotic rate is a stronger predictor. Thus, the American Joint Committee on Cancer (AJCC) staging system has replaced the Clark level with mitotic rate, and, in all primary melanomas, pathologists should assess mitotic rate.

Since the original report by Wallace H. Clark Jr and colleagues in 1969, the "Clark level" has been an institutional part of the histopathological classification of cutaneous melanoma (1). However, in the revised version of the American Joint Committee on Cancer (AJCC) staging system, the Clark level is replaced by mitotic rate as a primary criterion for defining the subcategory of T1b melanomas (2, 3). The revised tumour-node-metastasis (TNM) staging of melanoma (Table I) is now in international use.

T-category

The AJCC melanoma staging system is based on a prospective database of nearly 60,000 patients with cutaneous melanoma from 17 cancer centres and organizations. Breslow thickness and tumour ulceration continue to define T-category. When Breslow thickness, ulceration and mitotic rate were included in multivariate analysis, Clark level was not a statistically significant predictor of survival outcome for T1 melanoma patients, whereas mitotic rate was the second most powerful predictor after Breslow thickness. This understanding led to an important change in the revised staging system, and currently, pathologists should assess mitotic rate in all primary melanomas. For classifying T1 melanomas, mitotic rate is defined as the number of mitoses per mm^2, with a threshold of $\geq 1/mm^2$ for category T1b (2, 3).

Table I. *2010 TNM staging of cutaneous melanoma*

T	Breslow thickness (mm)	Ulceration/mitoses
T1	≤ 1.00	a: No ulceration and mitotic rate < 1 /mm^2 b: Ulceration present or mitotic rate ≥ 1 /mm^2
T2	1.01–2.00	a: No ulceration b: Ulceration present
T3	2.01–4.00	
T4	> 4.00	
N	**Number of metastatic lymph nodes**	**Nodal tumour burden**
N0	0	
N1	1	a: Microscopic metastasis* b: Macroscopic metastasis
N2	2–3	
N3	≥ 4	
M	**Site of distant metastasis**	**Serum lactate hydrogenase level**
M0	–	–
M1a	Skin, subcutaneous fat, distant lymph nodes	Normal
M1b	Lung	Normal
M1c	Other visceral organ	Elevated

*Identification is based on sentinel node biopsy.

N-category

Compared with 2002 TNM staging, there are no major changes in nodal staging. Components that define the

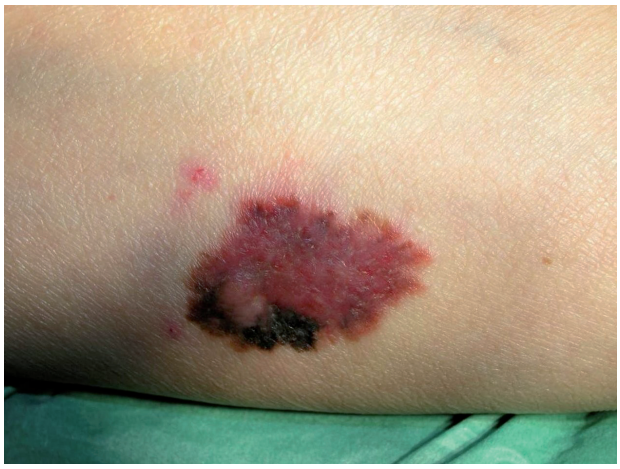

Fig. 1. TNM (tumour-node-metastasis) classification of the cutaneous melanoma should include mitosis rate, defined as the number of mitoses per mm^2. This change replaces the Clark level for this superficially spreading melanoma.

N-category are the number of metastatic nodes, tumour burden, and the ulceration of primary lesion. In N-positive patients (stage III), tumour burden is either microscopic, i.e. only detected histopathologically, or macroscopic, i.e. detected clinically or radiologically. Approximately 20% of patients with clinically localized melanoma have occult microscopic disease in their regional lymph nodes. Their detection is based on sentinel node biopsy (SNB). Because regional nodal status is the single most important predictor of survival in melanoma, the sentinel node procedure has become the standard method for staging nodal metastases. There is no lower threshold of staging nodal disease: even isolated tumour cells detected by immunohistochemistry should be scored as N-positive, because they are clinically important (2, 3).

M-category

In general, advanced-stage metastatic melanoma (stage IV) is associated with poor prognosis. However, there is considerable prognostic heterogeneity among patients with stage IV disease. An option for curative surgery should be considered if the disease is limited to few sites with a limited number of metastases. This option for metastasectomy is particularly associated with solitary metastases of the skin, subcutaneous fat, distant lymph nodes, and lungs.

Conclusion

In conclusion, TNM staging of melanoma is still a useful shorthand system for describing the extent of disease. According to 2010 TNM classification, mitotic rate should be given routinely in the histopathological reports of primary tumour. However, the historical Clark level of invasion should not be abandoned. Beyond the official TNM-staging, Clark level is still a simple parameter for a pathologist to measure and for a surgeon to understand.

References

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