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## Prognostic value of the Breslow:diameter ratio in cutaneous melanoma

*To the Editor:* The most frequently used staging system in melanoma is based on the TNM classification, which includes the variables for tumor thickness, lymphatic spreading, and the presence of distant metastasis and ulceration. The thickness of the primary tumor is assessed by the Breslow index, which influences the T stage; an increase in the Breslow index is directly associated with a decrease in overall survival and is the most decisive factor in this regard.[1,2] The diameter of a melanoma is not always related to its increase in depth, which brings into question whether a proportion that takes into

**Table I.** General characteristics of the series

| Characteristic | Value |
|---|---|
| Age, y, n = 306, n ± SD (range) | 52.3 ± 15.6 (8-85) |
| Sex, n = 306 | |
| Male | 142 (46.4) |
| Female | 164 (53.6) |
| Diagnosis, n = 306 | |
| Superficial spreading melanoma | 219 (71.6) |
| Nodular melanoma | 68 (22.2) |
| Acral lentiginous melanoma | 14 (4.6) |
| Lentigo maligna melanoma | 5 (1.6) |
| Location, n = 306 | |
| Head and neck | 23 (7.5) |
| Lower limb | 93 (30.4) |
| Trunk | 150 (49.0) |
| Upper limb | 40 (13.1) |
| Diameter, mm, n = 306, n ± SD (range) | 12.8 ± 7.8 (6-60) |
| Breslow index, n = 306, n ± SD (range) | 2.35 ± 2.40 (0.17-23.00) |
| BDR, n = 306, n ± SD (range) | 0.21 ± 0.23 (0.01-2.99) |
| Clark level, n = 298 | |
| II | 56 (18.8) |
| III | 130 (43.6) |
| IV | 93 (31.2) |
| V | 19 (6.4) |
| TNM stage, n = 306 | |
| I | 145 (47.4) |
| II | 91 (29.7) |
| III | 70 (22.9) |
| Ulceration, n = 265 | 75 (28.3) |
| Regression, n = 256 | 73 (24.6) |
| Inflammatory infiltrate, n = 256 | |
| No | 39 (15.2) |
| Mild | 106 (41.4) |
| Moderate | 79 (30.9) |
| Severe | 32 (12.5) |
| Lymphovascular invasion, n = 191 | 39 (20.4) |
| Satelitosis, n = 53 | 4 (7.5) |
| Mitotic rate, n = 139 | |
| <1 | 16 (11.5) |
| ≥1 | 123 (88.5) |
| <2 | 57 (41.0) |
| ≥2 | 82 (59.0) |
| Previous excision, n = 306 | 273 (89.2) |
| No. lymphatic drainages, n = 306 | |
| 1 | 240 (78.4) |
| 2 | 62 (20.2) |
| ≥3 | 4 (1.3) |
| Surgical technique, n = 306 | |
| Margins + plasty | 4 (1.3) |
| Exeresis + graft | 70 (22.9) |
| Margins | 226 (73.9) |
| SNB only | 6 (2.0) |

Continued

**Table I.** Cont'd

| Characteristic | Value |
|---|---|
| Nodal involvement, n = 306 | 70 (22.9) |
| Type of nodal metastases, n = 303 | |
| Isolated tumor cells | 9 (13,6) |
| Micrometastases | 25 (37.9) |
| Macrometastases | 32 (48.5) |
| Treatment with interferon, n = 163 | 65 (39.9) |
| Radiotherapy, n = 257 | 14 (5.4) |
| Chemotherapy, n = 155 | 20 (13.2) |

Values are n (%) accept where indicated.
*BDR*, Breslow:diameter ratio; *SD*, standard deviation; *SNB*, sentinel node biopsy.

account these 2 variables could be more useful than the superficial dimension alone.[3-5]

A retrospective observational study was carried out to determine the relationship between the Breslow:diameter ratio (BDR) and overall survival or disease-free survival in patients with melanoma and to establish a cutoff for BDR that has prognostic value.

Patients who underwent surgery consecutively for cutaneous melanoma and a sentinel lymph node biopsy for diagnostic purposes were included. The cases with a minimum follow-up of 2 years were selected. The study was evaluated and approved by our institutional review board. Clinical and histopathologic variables from the primary tumor and the sentinel node were recorded. We recorded the follow-up variables, melanoma-specific overall survival, and melanoma-specific disease-free survival since the surgery in months. As an independent variable, BDR was calculated as the Breslow depth divided by the largest diameter of the lesion. Only complete lesions were considered, and depth and diameter were measured in millimeters after fixation for all the cases.

We determined potential cutoff points for the BDR variable through receiver operating characteristic curve analysis and the Youden test, and a survival analysis was performed, with the 2 groups of patients classified in accordance with their BDR. The survival analysis was performed by means of Kaplan-Meier curves and the log-rank test.

A total of 306 patients were included (Table I). The receiver operating characteristic curve for different values of BDR shows an area under the curve of 0.77 as a prognostic variable, with an optimal value of 0.15 (Youden index). Therefore, this value was considered when establishing into which groups the patients were classified.

The univariate analysis showed significant differences between BDR values >0.15 and ≤0.15

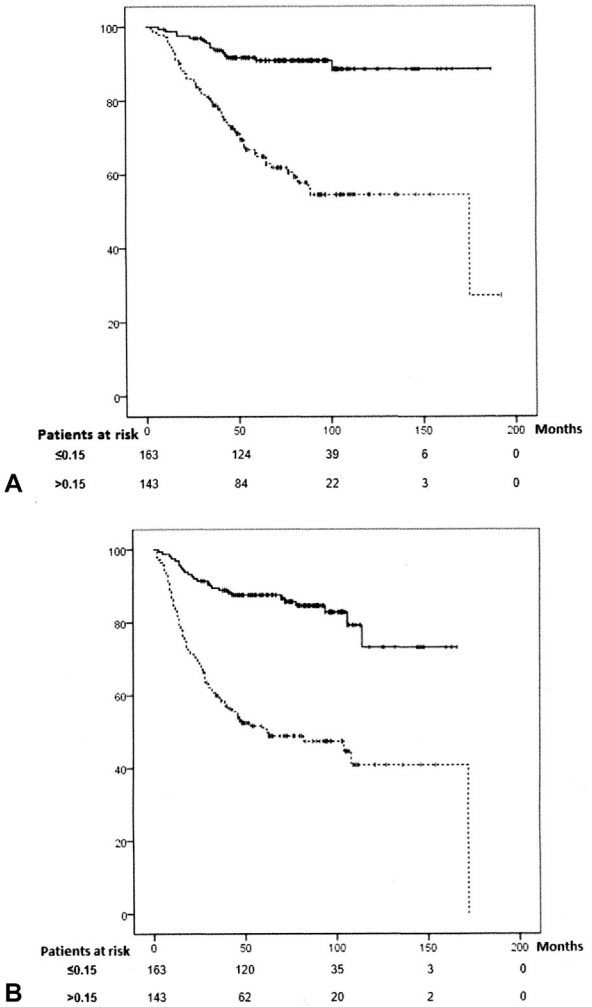


**Fig 1.** Melanoma-specific overall survival (**A**) and disease-free survival (**B**) of patients. The continuous line represents the group of patients with a Breslow:diameter ratio (BDR) of ≤0.15. The discontinuous line represents patients with a BDR of >0.15 ($P < .001$).

regarding age ($P = .003$), sex (men; $P = .013$), histologic type (nodular melanoma vs superficial spreading melanoma; $P = .001$), Clark level ($P < .001$), TNM stage ($P < .001$), ulceration ($P < .001$), lymphovascular permeation ($P < .001$), high mitotic index ($P < .001$), and lymph node involvement ($P < .001$). Among patients with lymph node disease, a BDR ≤0.15 was associated with isolated tumor cell metastasis or micrometastasis and a BDR >0.15 with macrometastasis ($P < .05$). Differences in melanoma-specific overall survival and melanoma-specific disease-free survival were found between these 2 BDR groups ($P < .001$) (Fig 1).

Considering these findings, BDR could be a useful complementary diagnostic tool in cutaneous melanoma assessment, and a cutoff point of 0.15

could be its prognostic limit. Further studies would be needed to assess if a diameter range should be applied to the BDR; although, in general, thin lesions of large diameters correlate with low BDR and thick lesions with a small diameters correlate with high BDRs, lesions with large diameters and focal deep components would suggest a favorable BDR and prognosis but an unfavorable Breslow prognosis.

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## Vulvar cancer association with groin hidradenitis suppurativa: A large, urban, midwestern US patient population study

*To the Editor:* Anogenital cancer risk factors include age, smoking, human papilloma virus, and lichen sclerosus. Recently, 13 cases of secondary anogenital cancer, including vulvar cancer, were described with pre-existing hidradenitis suppurativa (HS).[1] However, association between anogenital cancer and HS has not been assessed to date.

The aims of this study were to determine whether there is an association between HS and anogenital cancer and to compare the incidence of anogenital cancer among adult females with HS with that among the US adult female population.

Existing data from the Northwestern Medicine Enterprise Data Warehouse, a previously described repository of medical record data of more than 5 million patients,[2] were extracted; the data extracted were from January 2001 to October 2017 for females age 18 to 89 years with dermatologist follow-up of at least 1 year. In these data, HS was indicated by *International Classification of Diseases, Ninth and 10 Revision* (ICD-9/10) codes (705.83 and L73.2). The control population consisted of all adult female dermatology patients without HS. The outcomes of interest were a subsequent diagnosis of anal cancer (ICD-9/10 codes 154.2, 154.3, and C21) or subsequent diagnosis of genital cancer (cancer of the vulva, labia minora/majora, and vagina) (ICD-9/10 codes 184, C51, and C52) recorded at least 2 months after the diagnosis of HS (or first dermatology encounter date for the controls). The data collected included age, race, smoking status, a diagnosis of lichen sclerosus, and duration of follow-up.

Adjusted odds ratios and 95% confidence intervals were estimated by using multivariate logistic regression analysis. In addition, the Surveillance, Epidemiology, and End Results 2000-2014 database was utilized to estimate the nationwide incidence of anogenital cancer.[3]

Data for a total of 133,936 patients qualified for analysis (Table I and Fig 1). Of these patients, 716 had HS; vulvar cancer was diagnosed in 3 of the 716 (2 African American and 1 white patient age 45-59 years). No other anogenital cancers were detected in patients with HS. All 3 patients with vulvar cancer had groin HS (adjusted odds ratio, 5.56; 95% confidence interval, 1.74-17.76; $P = .004$), and none of the 3 had lichen sclerosus or human papilloma virus. Moreover, the age-adjusted incidence of vulvar cancer among females with HS in this study population (2.8 per 10,000 persons/y) was 8-fold greater than the age-adjusted nationwide