# Accuracy of biopsy sampling for subtyping basal cell carcinoma

Andrea L. Haws, MD, MS,[a] Rafael Rojano, MD,[a] Steven R. Tahan, MD,[b] and Thuy L. Phung, MD, PhD[a]
*Houston, Texas, and Boston, Massachusetts*

***Background:*** Basal cell carcinoma (BCC) is a common skin cancer for which the treatment and recurrence risk correlate with the histologic subtype. Limited information is available regarding the accuracy of biopsy in diagnosing BCC subtypes.

***Objective:*** We sought to determine the correlation between BCC subtypes present in a biopsy specimen and the actual subtypes present in a tumor.

***Methods:*** In this retrospective study, skin biopsy specimens and corresponding excisions were reviewed. All histologic subtypes present in the biopsy specimen were reported and compared with the composite BCC subtype present in the biopsy specimen and excision.

***Results:*** A total of 232 biopsy specimens and corresponding wide excisions were examined. The biopsy specimen accuracy rate was 82% for punch and shave biopsy specimens. Mixed histologic subtypes were seen in 54% of the cases, half of which contained an aggressive subtype (infiltrative, morpheaform, or micronodular). There was an 18% discordance rate between the biopsy specimen subtype and the composite subtype. Importantly, 40% of these discordant cases (7% of all cases examined) had an aggressive subtype that was not sampled in the initial biopsy specimen. Furthermore, some cases were misidentified as infiltrative subtype in the biopsy specimen as a result of misinterpretation of surface ulceration and reactive stromal changes.

***Limitations:*** The limited number of punch biopsy specimens and the fact that Mohs excisions were not included are limitations.

***Conclusions:*** Punch and shave biopsy specimens provided adequate sampling for correct BCC subtyping in 82% of the cases examined. However, 18% of the biopsy specimens were misidentified, some of which missed an aggressive component. Thus, there are potential pitfalls in the identification of BCC subtypes in biopsy specimens, which may have important implications in treatment outcome. (J Am Acad Dermatol 2012;66:106-11.)

***Key words:*** accuracy; basal cell carcinoma; biopsy; excision; histologic subtypes.

Basal cell carcinoma (BCC) is one of the most common human cancers and constitutes more than 80% of nonmelanoma skin cancers.[1,2] Although BCC is a tumor with low metastatic potential, it can be locally destructive and invasive.[2,3] There are multiple known histologic subtypes (ie, growth patterns) of BCC. Each subtype has an associated biological behavior that can affect the likelihood of tumor recurrence and treatment modality.[4-6] Infiltrative, morpheaform, and micronodular BCC are aggressive subtypes and have a high likelihood of incomplete excision and recurrence.[4,7] BCC with mixed histologic subtypes is defined as tumor composed of two or more growth patterns within the same lesion, such as superficial pattern in the epidermis and infiltrative pattern in the dermis. These tumors behave in the manner of the most aggressive subtype present.[6,7] Noninvasive treatment may be offered for selected patients with low-risk superficial BCC,[6] whereas Mohs

From the Department of Pathology and Immunology, Baylor College of Medicine, Houston,[a] and Department of Pathology, Beth Israel Deaconess Medical Center and Harvard Medical School, Boston.[b]
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Reprint requests: Thuy L. Phung, MD, PhD, Baylor College of Medicine, One Baylor Plaza, Mail Stop Code BCM315, Houston, TX 77030. E-mail: tphung@bcm.edu.
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micrographic surgery is recommended for recurrent facial BCC and BCC with aggressive subtypes.[8]

Evaluation of BCC is made on a clinical basis and supported by a shave or punch skin biopsy to establish the diagnosis. However, only a few studies to date, each with different criteria for determining biopsy-excision concordance, have evaluated the correlation of BCC subtypes present in the initial biopsy specimen and the follow-up wide excision. It has been reported that the accuracy rate of BCC subtyping in biopsy specimen is 80%.[9] However, studies of patients who underwent Mohs micrographic surgery for BCC reported low correlation between biopsy specimen and Mohs excision. One study reported that only 10% of the initial biopsy specimens reported BCC with mixed subtypes when these tumors were actually found in 40% of Mohs resections, and a second study reported 51.1% concordance of biopsy specimen with Mohs excision.[8,10]

**CAPSULE SUMMARY**

- Current management of basal cell carcinoma depends on the tumor's biologic behavior, which correlates with its histologic growth pattern.
- Biopsy specimen did not correctly identify histologic subtypes in basal cell carcinoma in 18% of the cases examined; 40% of these cases had an aggressive subtype not sampled in the initial biopsy specimen.
- Broad and deep biopsy specimen to sample the superficial and deep aspects of basal cell carcinoma would improve tumor subtyping accuracy. All tumor subtypes present should be reported.

Given the limited numbers of published studies evaluating the adequacy of biopsy specimen for BCC subtyping and the wide differences found in these reports, we undertook a study to systematically compare the tumor subtypes present in the initial biopsy specimen with the composite subtypes present in the biopsy specimen and wide excision. We determined the accuracy rate of biopsy specimen in correctly identifying all the subtypes present in a tumor, and evaluated trends toward misidentification of tumor subtypes.

## METHODS

The use of pathology archival material was approved by the Institutional Review Boards at the Beth Israel Deaconess Medical Center, Boston, MA, and Baylor College of Medicine/Ben Taub General Hospital, Houston, TX. This retrospective study included a total of 232 cases from these two institutions. Inclusion criteria were patients with primary cutaneous BCC and subsequent wide excision. Cases that had no residual BCC tumor in the excision were excluded. Of 232 cases, 128 cases were from the Department of Pathology, Beth Israel Deaconess Medical Center, submitted over a 23-month period from January 1, 2001, to November 1, 2002. These biopsy specimens and excisions were independently reviewed by two dermatopathologists who were blinded to patient identification. An additional 104 cases were from the Department of Pathology, Ben Taub General Hospital, submitted from October 7, 2004, to October 1, 2009. These biopsy specimens and excisions were reviewed by one pathologist who was blinded to patient identification.

The BCC subtypes were identified based on standard histopathologic characteristics.[4,11] Superficial BCC is tumor consisting of multiple small islands of basaloid cells attached to the epidermis and confined to the papillary dermis. Nodular BCC has small and large rounded nests of tumor cells with peripheral palisading present in the dermis or growing predominantly downward from the epidermis into the dermis. Micronodular BCC resembles nodular type but the nests are much smaller with wide infiltration in the dermis. Infiltrative BCC has irregular, thin nests and cords of basaloid cells, some of which may have an irregular outline with pointed spiky projections, interspersed and infiltrating between dermal collagen bundles. Morpheaform BCC consists of narrow elongated strands and small islands of tumor cells embedded within a dense fibrous stroma. Metatypical BCC is tumor with nests and strands of basaloid tumor cells that mature into larger paler cells.

Upon review of biopsy specimens and excisions, every subtype present in the tumor was recorded. The composite BCC subtypes were defined as the combined subtypes present in the biopsy specimen and the wide excision. BCC with mixed subtypes was defined as tumor consisting of two or more growth patterns within the same lesion, such as superficial subtype in the epidermis and infiltrative subtype in the dermis. Different BCC subtypes were grouped based on biologic behavior: nonaggressive subtypes consisting of superficial and nodular patterns; and aggressive subtypes consisting of infiltrative, micronodular, morpheaform, or metatypical pattern. Percent concordance was calculated as the percent of cases in which the BCC subtypes present in the biopsy specimen were the same as the composite subtypes. Percent discordance was calculated as the