

## Cytokeratin Expression in Trichilemmal Carcinoma Suggests Differentiation Towards Follicular Infundibulum

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**Abstract.** An immunohistochemical study of cytokeratins (CK) in a case of trichilemmal carcinoma (TLC). CK expression showed the presence of CK 1, 10, 14 and 17, suggesting that TLC differentiates toward follicular infundibulum. In a comparison of CK expression between TLC and trichilemmoma, the absence of CK 15 and 16 in TLC may be related to transformation from trichilemmoma to TLC.

Trichilemmal carcinoma (TLC) is a rare cutaneous tumor, and is considered as a malignant counterpart of trichilemmoma (1). The histogenesis of TLC remains unclear. The features of TLC resemble the outer root sheath (1, 2). Monoclonal antibodies against cytokeratin (CK) are crucial markers for evaluating the origin of epithelial tumors and the stage of differentiation. To elucidate the origin and the stage of differentiation of TLC, an immunohistochemical study of CK was performed using nine different anti-keratin antibodies against CK1, 7, 8, 10,14,16,17, 18 and 19.

### Case Report

A 71-year-old woman presented with an asymptomatic nodule on the left cheek for four months. The lesion was surgically excised with the surrounding normal skin 5 mm distant from the margin of the tumor at the subcutaneous tissue level. Each specimen was fixed in buffered formalin, embedded in paraffin, and stained with hematoxylin and eosin; serially-cut sections were used in the immunohistochemical study. The anti-keratin

antibodies used (3) were as follows: 34βB4 (CK1), LP5K (CK7), LP3K (CK8), LHP1 (CK10), LL002 (CK14), LHK15 (CK15), LL025 (CK16), E3 (CK17), 5D3 (CK18) and b170 (CK19) (all from Novocastra Laboratories Ltd., Newcastle-upon-Tyne, United Kingdom). The immunohistochemical study was based on the labeled streptoavidin-biotin method (LSAB, Dako, Carpinteria, CA, USA) reported previously (3). Normal skin from the face served as control.

**Hematoxylin and eosin staining.** Histopathological findings on TLC showed multilobulate tumor islands connected to the epidermis and infundibulum. These were divided into two components: tumor nests (TN) and keratinizing ductal epithelium (KDE). Areas of keratinization showed epidermoid keratinization with keratohyaline granules.

The tumor cells showed remarkable atypia with abundant mitosis. The outermost cells of tumor nests were distributed in a roughly palisading pattern.

**Immunohistochemical findings.** CK 1 and 10 were positive in both TN and KDE. CK 10, found in suprabasal layers in the epidermis, was present in KDE and TN (Figure 1). CK 14 was positive in both KDE and TN at high intensity in the outermost cells. CK 17 was positive in KDE (Figure 2) and negative in TN. CK 7, 8, 15, 16, 18 and 19 were negative in both TN and KDE.

### Discussion

TLC grows clinically as a papule, indurated plaque, or nodule that occasionally ulcerates. In these cases histopathologically, tumor nests were observed continuous with the epidermis and infundibulum. The outermost cells of multilobulated tumor nests with high-grade atypia showed palisading. This case was, therefore, diagnosed as TLC. In TLC, trichilemmal keratinization was common, as in previous reports (1, 2). However, epidermoid keratinization

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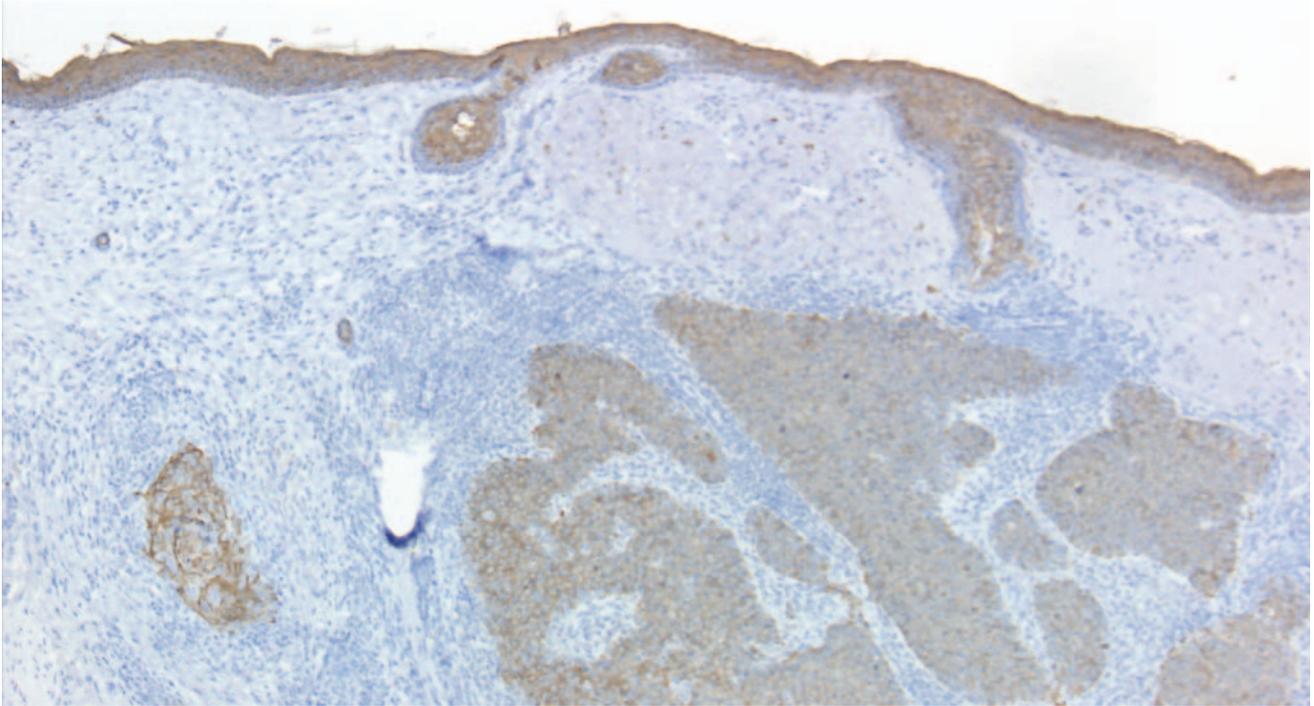


Figure 1. CK 10 was positive in KDE and TN (immunohistochemical staining, original magnification x20).

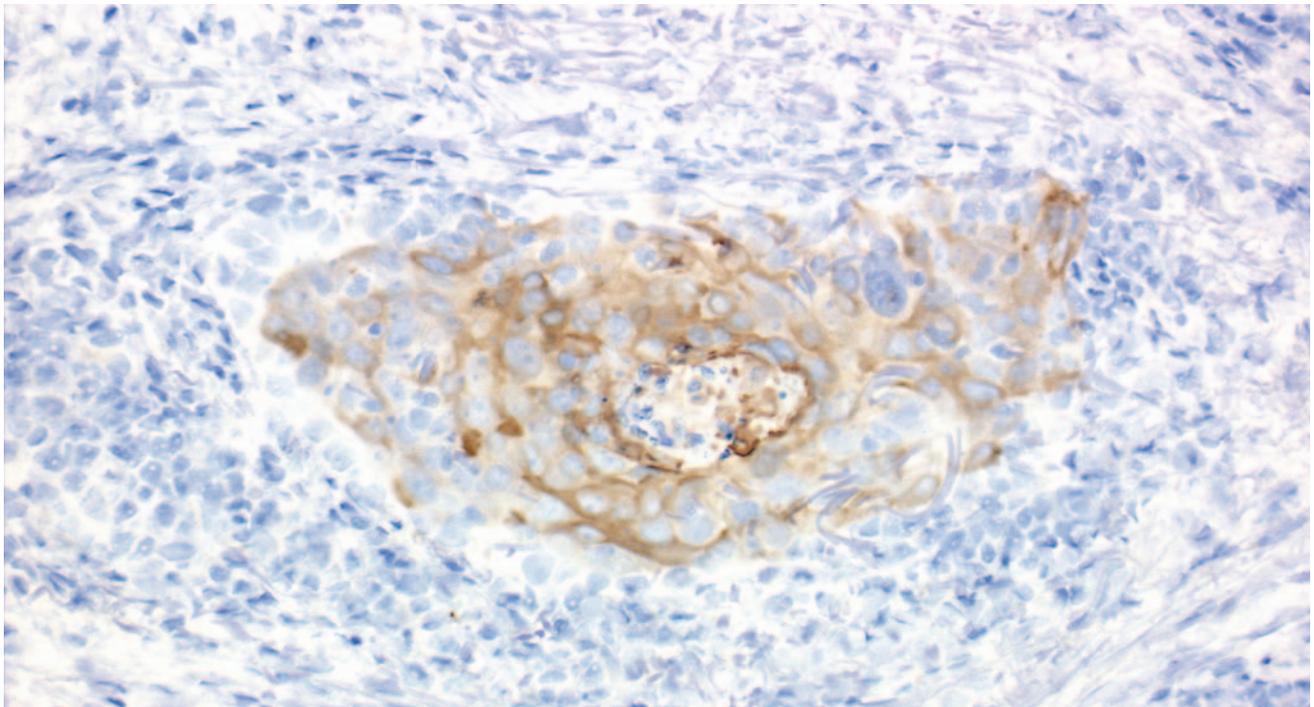


Figure 2. CK 17 was positive in KDE (immunohistochemical staining, original magnification x100).

has been found with keratohyaline granules (4). In our case, epidermoid keratinization was found.

There has been one report in which CK 17 was present in multiple TLC with perineural invasion (1). This previous report (1) also suggests that TLC differentiates toward the outer root sheath. In our study, CK 1 and 10 (stratified keratin) were present in TLC. The keratin expression of TLC was identical with that of the epidermis and the infundibulum. In spite of high-grade atypia, stratified keratin expression was preserved. The presence of stratified keratin in TLC may reflect indolent prognosis. CK 14 (basal keratin) was also found in TLC. CK 17 (hyperproliferative keratin) was observed only in KDE in TLC, not in TN. KDE in TLC has the same character as the infrainfundibulum in keratin expression. The other keratins of CK 7, 8, 15, 16, 18 and 19 were absent in TLC. CK8 and CK18, which are embryonic simple epithelial keratins, are found in poorly-differentiated squamous cell carcinoma (5). However, these keratins were not found in TLC, suggesting benign prognosis with an indolent clinical course (2). Recurrence of TLC after therapy has rarely been reported. Keratin profiles of TLC were quite similar to those of the infundibulum, suggesting that TLC differentiates toward follicular infundibulum.

CK expression profiles in TLC and trichilemmoma (3) were compared, showing similar patterns of CK 14, 17 and 19. CK 1 and CK 10, present in TN in trichilemmoma, were absent in KDE in TLC. CK 15 and 16, present in TN in trichilemmoma, were absent in TLC. Jih *et al.* (6) reported the absence of CK

15 in squamous cell carcinoma. Absence of CK 15 might be responsible for malignant transformation. CK 16, hyperproliferative keratin was absent in TLC. These results suggest that the absence of CK 15 and 16 may be associated with malignant transformation from trichilemmoma to TLC.

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