

Cutaneous dermoid cyst: Cytokeratin and filaggrin expression suggesting differentiation towards follicular infundibulum and mature sebaceous gland

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Abstract. We experienced two cases of cutaneous dermoid cysts (DC). To elucidate the histogenesis of DC, we have studied cytokeratin (CK) expression in DC using ten different anti-keratin antibodies against CK1, 7, 8, 10, 14, 15, 16, 17, 18 and 19, and anti-filaggrin (filament aggregating protein) antibody. In the cyst wall of DC, CK1 and 10 were expressed in suprabasal layer, and CK14 was limited to the basal layer. In sebaceous gland-like structures, CK14 was detected in sebaceous acinus, and CK17 was detected in sebaceous duct. The other CKs were not detected. Filaggrin was intensely detected in the granular layer in the cyst wall of DC. CK expression profile of DC was similar to follicular infundibulum and sebaceous gland. These results suggested that DC differentiates towards follicular infundibulum and mature sebaceous gland.

Introduction

Cutaneous dermoid cysts result from the sequestration of cutaneous tissue along lines of embryonic fusion (1). DC in the periorbital area, midline of the neck, nasal root, forehead, mastoid area and the scalp have been reported (2). DCs of the auricle are very rare (3). The histogenesis of DC still remains unclear.

CK is an essential marker to evaluate the origin of epithelial tumors (4). Besides CK, filament aggregating protein (filaggrin), a histidine-rich phosphorylated basic protein of major constituents of keratohyaline granules, is a marker of terminal differentiation of epidermis (5). No immunohistochemical study of CK and filaggrin in DC has been reported.

To elucidate the histogenesis of DC, we studied CK and filaggrin expression in DC using ten different anti-keratin antibodies against CK1, 7, 8, 10, 14, 15, 16, 17, 18 and 19, and anti-filaggrin antibody.

Materials and methods

The patient, a 48-year-old male had DC located on the left postauricular area from at birth. The other patient, a 31-year-old female developed DC on the right postauricular area ten years ago. The lesions were surgically excised. Each specimen was formalin-fixed, paraffin-embedded, stained with hematoxylin and eosin, and serially-cut sections were used for the immunohistochemical study. The anti-keratin antibodies used were as follows: 34BB4 (CK1) (6), LHP1 (CK10) (7), LL002 (CK14) (7), LHK15 (CK15) (8), LL025 (CK16) (7), E3 (CK17) (7), 5D3 (CK18) (7) and b170 (CK19) (9) (all from Novocastra Laboratories Ltd., Newcastle-upon-Tyne, UK).

The immunohistochemical study was carried out with the labeled streptavidin-biotin method (LSAB, Dako, Carpinteria, CA, USA) was performed as previous study (10). Normal skin from the auricle served as controls.

Results

Hematoxylin and eosin staining. Histopathological findings of the cases were similar. The cyst wall of DC was located in the deep dermis. Cyst wall was partly ruptured, resulting in the fibrosis with vellus hairs. The cyst wall was formed with keratinizing epithelium in granular layers. The keratinizing epithelium partly projected into the lumen-like crenulation. Thick laminated corneocytes were observed. In the vicinity of the cyst wall, sebaceous gland-like structure was observed (Fig. 1).

Immunohistochemical findings. CK and filaggrin expression in normal pilosebaceous unit, DC and steatocystoma multiplex (10) was summarized in Table I.

The epithelial components of DC were divided into two structures: cyst wall and sebaceous gland-like structure (SGLS). CK1 (Fig. 2) and CK10 were expressed in suprabasal

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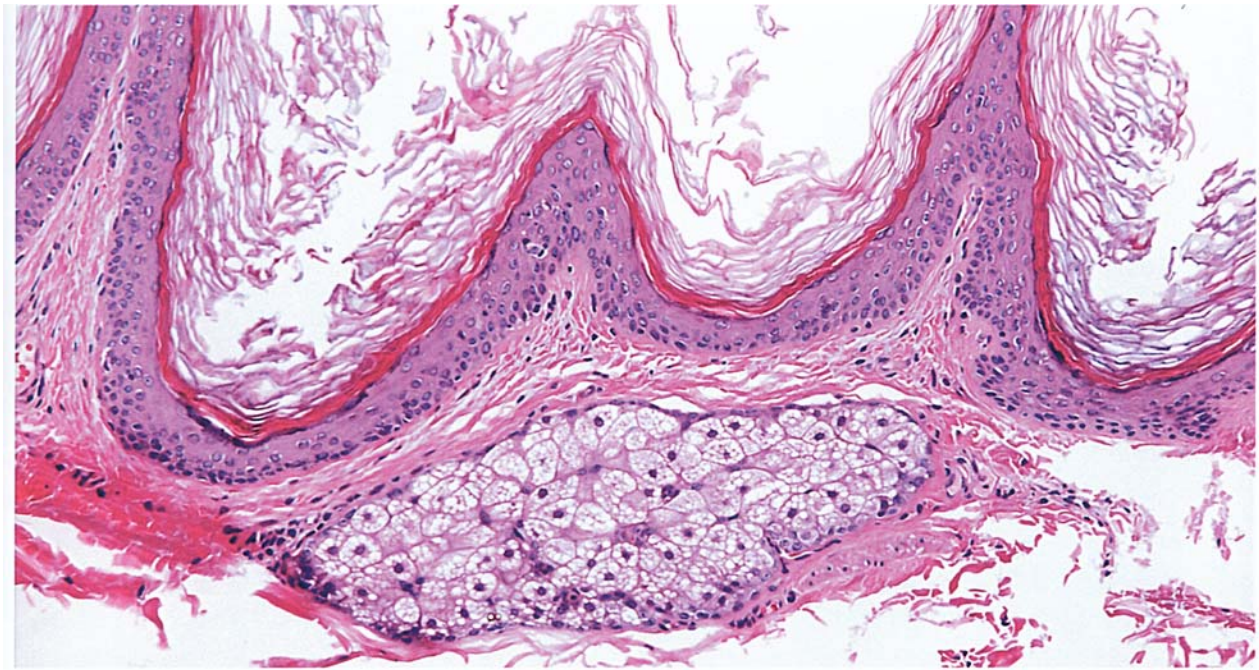


Figure 1. The crenulated cyst wall with keratohyaline granules projected into the lumen. In the vicinity of the cyst wall, sebaceous gland-like structure is observed (hematoxylin and eosin staining; original magnification x100).

Table I. CK and filaggrin expression in normal skin, dermoid cyst and steatocystoma multiplex.^a

	Normal skin				Dermoid cyst			Steatocystoma multiplex	
	Epidermis	Infundibulum	ORS	Sebaceous gland	Cyst wall	SGLS		Cyst wall	SGLS
CK1	+(sb)	+(sb)	-	-	+(sb)	-	-	-	-
CK7	-	-	-	-	-	-	-	-	-
CK8	-	-	-	-	-	-	-	-	-
CK10	+(sb)	+(sb)	-	-	+(sb)	-	-	-	-
CK14	+(sb)	+(b)	+	+	+(b) or -	+	-	+(b)	+(sc)
CK15	-	-	-	-	-	-	-	-	-
CK16	-	-	+(sb)	-	-	-	-	-	-
CK17	-	- or +	+(sb)	+(sdc)	-	-	+	+	+(sdc)
CK18	-	-	-	-	-	-	-	-	-
CK19	-	-	- or +	-	-	-	-	-	-
Filaggrin	+(g)	+(g)	-	-	++(g)	-	-	ND	ND

^asb, suprabasal layers; b, basal layer; g, granular layer; sc, sebocytes; sdc, sebaceous duct cells; SGLS, sebaceous gland like-structure; ND, not done; ORS, outer root sheath.

layers in the cyst wall, and were not expressed in SGLS. CK14 was partly expressed in basal layer in the cyst wall and sebaceous acinus in SGLS (Fig. 3). CK17 was found only in the sebaceous duct-like structure (Fig. 4). CK7, 8, 15, 16 and 18 were not detected in cyst wall and SGLS. Filaggrin was intensely detected in the granular layer in the cyst wall of DC (Fig. 5), but was not detected in SGLS.

Discussion

DC is usually a hamartoma which develops in head especially around eyes and neck. Histopathologically, DC is lined by an epidermis with epidermal appendages that are fully matured. In the lumen, hair shafts and keratin debris are commonly observed.

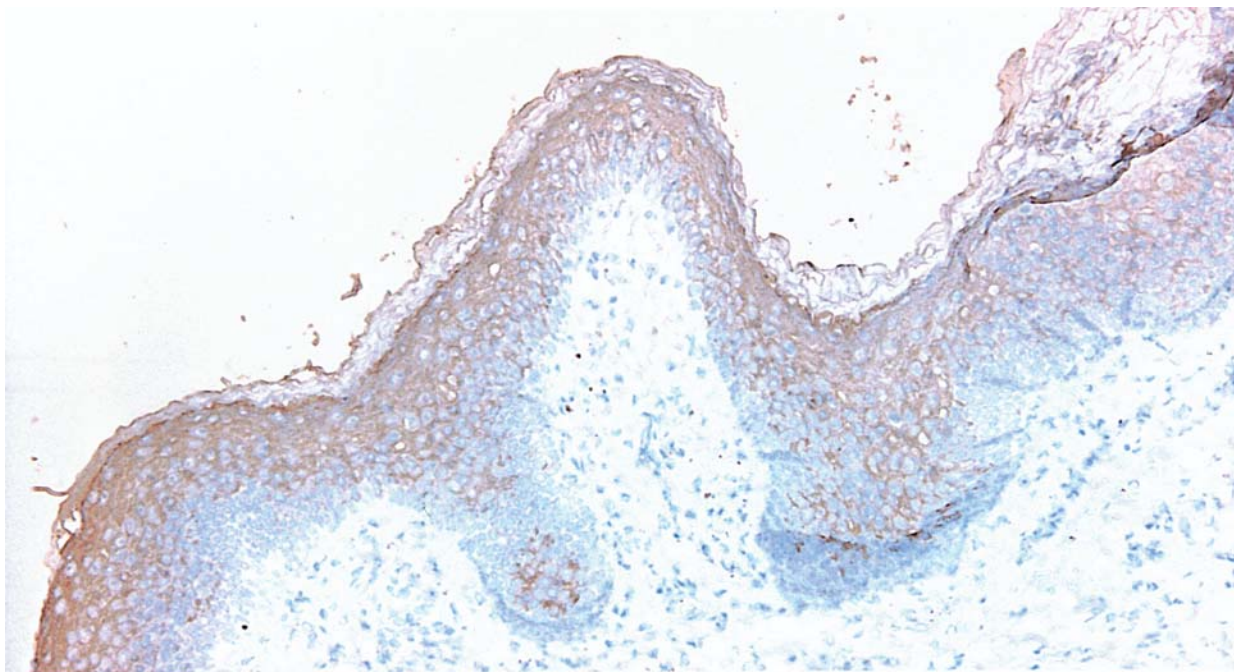


Figure 2. CK1 is expressed in suprabasal layers in the cyst wall (immunohistochemical staining; original magnification x100).

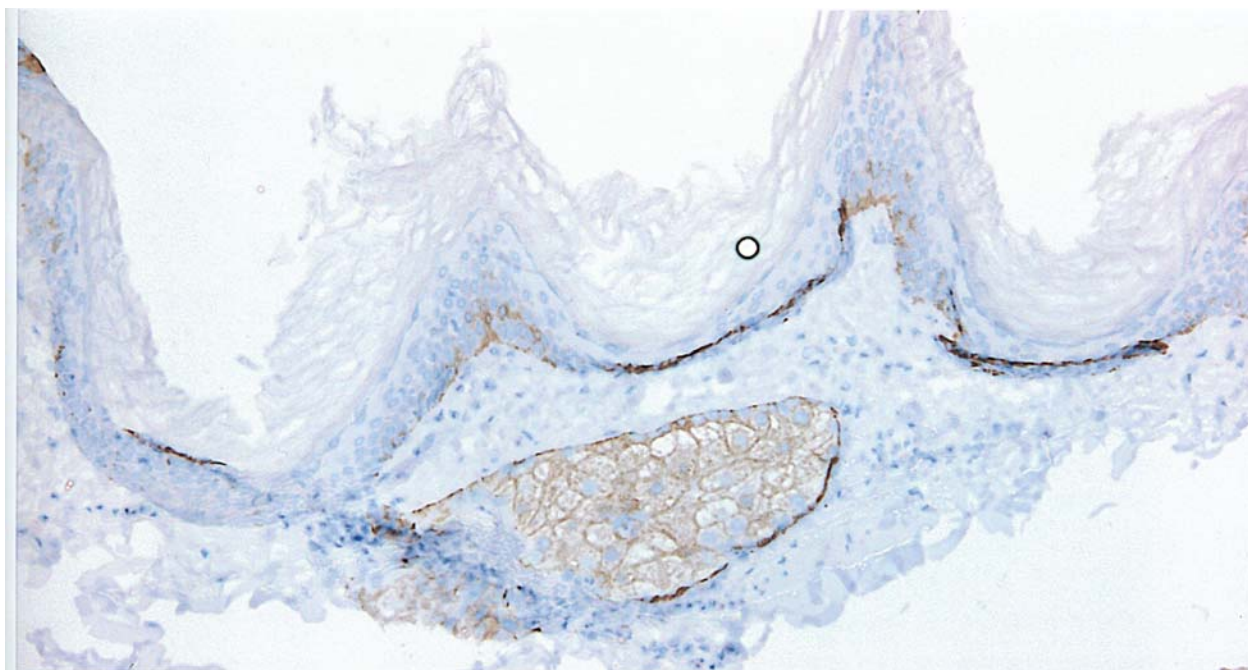


Figure 3. CK14 is partly expressed in basal layer in the cyst wall and sebaceous acinus in SGLS (immunohistochemical staining; original magnification x100).

In the normal pilosebaceous unit, CK and filaggrin expression has been reported previously (10-12). CK1 and 10 are detected in suprabasal layers in the epidermis and follicular infundibulum. CK14 is expressed in the basal layer in the epidermis and follicular infundibulum, and sebaceous acinus. CK16 is expressed in the outer root sheath beneath the opening of the sebaceous duct. CK17 is detected in the infrainfundibulum and sebaceous duct. Filaggrin is detected in the granular layer and superficial layer in the infundibulum and sebaceous duct.

Cyst wall expressed CK1 and 10 in the suprabasal layers. CK14 expression was limited to the basal layer. CK16 was not detected in the cyst wall. Filaggrin was intensely detected in the granular layer in the cyst wall. In steatocystoma multiplex, cyst wall express CK17, suggesting differentiation towards sebaceous duct (10). CK and filaggrin expression in the cyst wall of DC was similar to that of follicular infundibulum. In the lumen of DC, numerous vellus hairs were observed. These findings suggest that the cyst wall of DC differentiates towards follicular infundibulum.

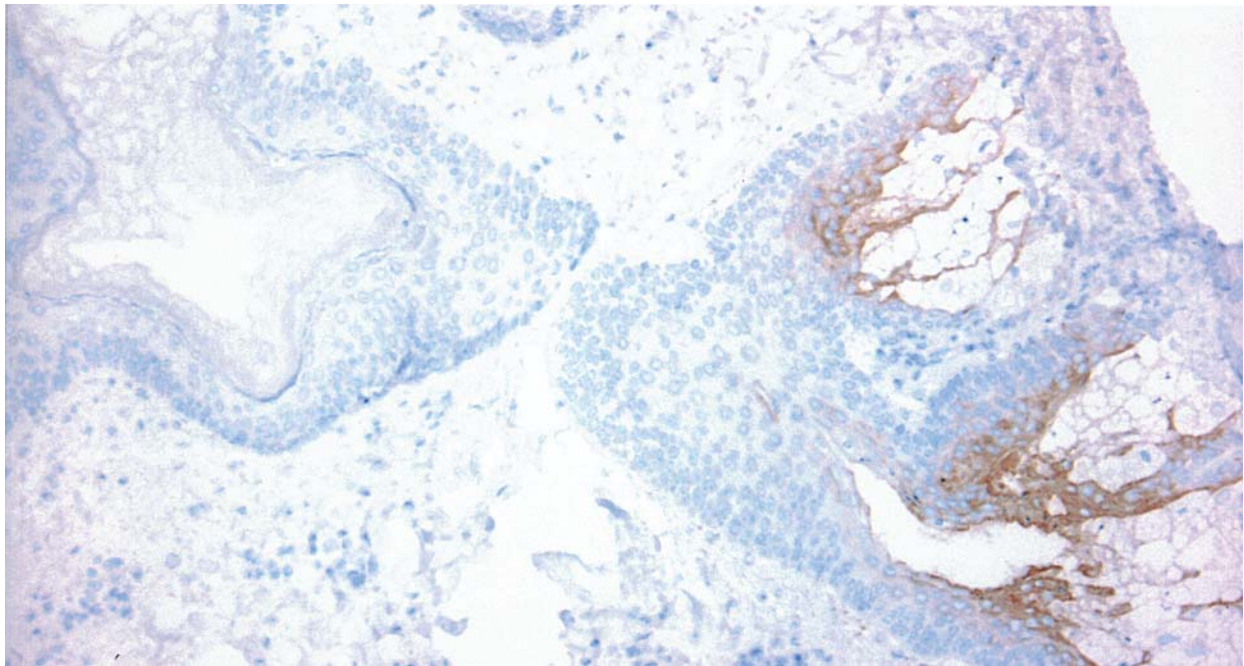


Figure 4. CK17 is found only in the sebaceous duct-like structure (immunohistochemical staining; original magnification x100).

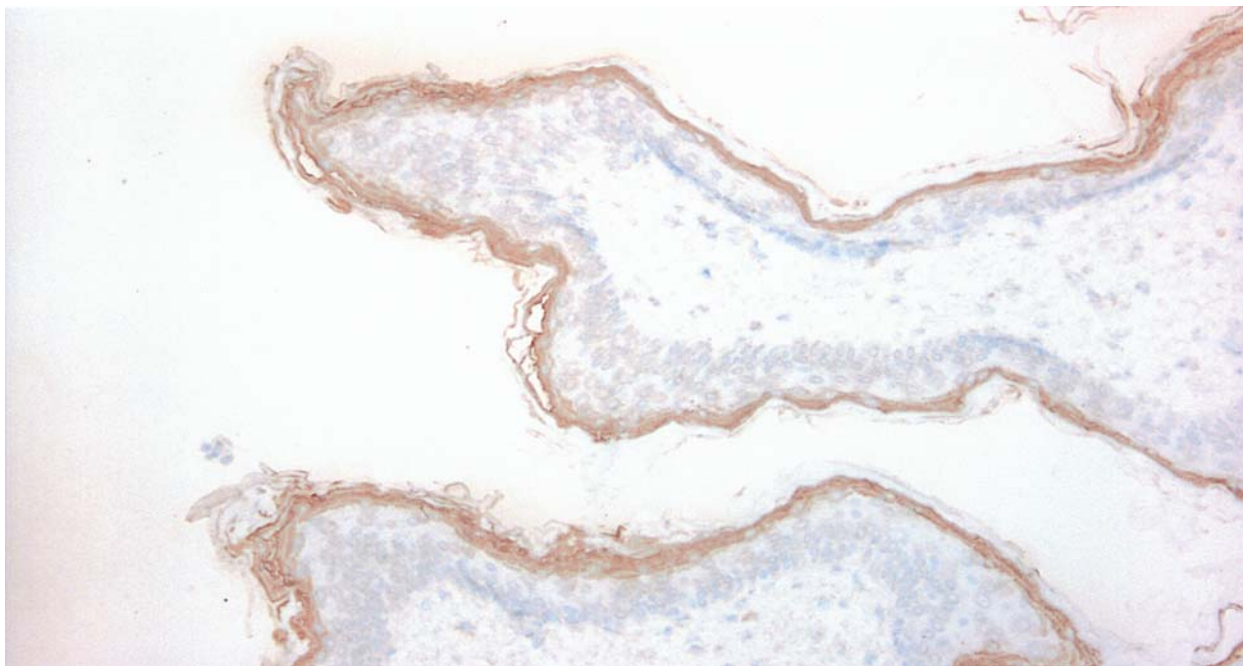


Figure 5. Filaggrin is intensely stained in the granular layer of the DC (immunohistochemical staining; original magnification x100).

In SGLS, CK14 was positive for acinus, and CK17 was positive in the duct-like structure. CK expression of SGLS was similar to that of sebaceous gland, suggesting SGLS in DC differentiates towards the mature sebaceous gland.

CK14 expression was relatively diminished, and CK16 and 17, hyperproliferative keratins, were not found in DC, suggesting that DC has characteristics of a nevus.

In epidermal cyst, CK expression is identical to that of follicular infundibulum or normal epidermis (13). In trichilemmal cyst, CK16 is expressed in the cyst wall (13), suggesting that trichilemmal cyst differentiates towards

follicular isthmus of the anagen-phase (14). Therefore, CK and filaggrin are useful markers to distinguish DC, epidermal cysts, steatocystoma multiplex and trichilemmal cysts.

Based on CK expression, our study clearly suggests that dermoid cyst differentiates towards follicular infundibulum and the mature sebaceous gland.

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