Banded Structures in Multiple Familial Trichoepithelioma

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A case of multiple familial trichoepithelioma was studied by electron microscopy. Tumour cells showed a dilated, rough endoplasmic reticulum (rER), in which banded, electron-dense structures measuring approximately 50 nm in width were found. Some of these banded structures were arranged parallel to each other with an interval of 250 nm. ***Key words: Ultrastructure; Endoplasmic reticulum.***

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The ultrastructure of both solitary and multiple trichoepitheliomas has been studied by several authors (1–6). Both tumour types are composed of basaloid cells, abortive hair shafts, hair papillae and keratinous cysts. In their electron microscopic study, Ono et al. (7) described peculiar enlarged rERs with banded structures in tumour cells of solitary trichoepithelioma. We would like to describe similar banded structures in a case of multiple, familial trichoepithelioma.

CASE REPORT

A 79-year-old patient with familial multiple cylindroma and trichoepithelioma has been observed by us over the last 28 years. In this patient's family, several members, in four generations, have presented with multiple cylindromas and (or) trichoepitheliomas. Because the patient had numerous large, partly ulcerated cylindromas in the scalp, on the ear lobes and on her face, at the age of 65 the whole scalp was removed and replaced by an autologous skin graft. Within the next 14 years, no tumour recurrence developed in the transplanted skin, but a few new tumours of varying size appeared on the patient's chest and back. In addition, the patient had multiple tumours measuring 2 to 5 mm in diameter in the nasolabial fold and on the forehead. One of the tumours of a light tan colour was excised. The tumour showed no umbilication or ulceration and no hairs were attached to it.

METHODS

The tumour nodule was removed under local anesthesia and was cut into two pieces. One was fixed in 4% neutral formalin for light microscopy, embedded in paraffinwax and stained with hematoxylin-eosin and periodic acid Schiff (PAS). The other piece was cut into 1 mm cubes, fixed by immersion in 4% buffered glutaraldehyde at pH 7.4, postfixed in 1% osmium tetroxide and embedded in Epon 812. Semithin sections were cut with a glass knife and stained with toluidine blue. Ultrathin sections were cut with a diamond knife, stained with uranyl acetate and lead citrate, and examined with a Philips 201 electron microscope.

RESULTS

Light microscopy

In the upper dermis, a well circumscribed tumour formed by aggregates of solid and adenoid basophilic cells was seen. The tumour cells showed peripheral palisading and were surrounded by a thin layer of PAS-positive basement membrane. Within the tumour cell islands, PAS-positive granules of varying size could be found. Several empty cysts, lined by a flattened epithelium, but no definite differentiation towards hair structures was seen (Fig. 1). Despite this fact, the tumour certainly does represent a trichoepithelioma. This is supported by the fact that the patient has multiple cylindromas which are known to be associated with trichoepitheliomas. Moreover, several tumours with the typical histology of trichoepithelioma have been removed from this patient before. It is also a well known fact, that especially multiple trichoepitheliomas may lack clear-cut differentiation towards hair structures and then may be indistinguishable from basal cell carcinoma.

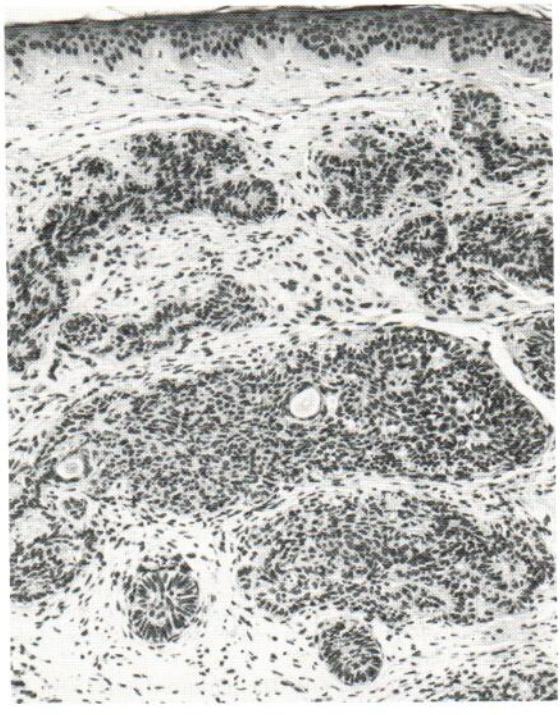

Fig. 1. Tumour consisting of solid aggregates of tumour cells with palisading cells at periphery of tumour cell nodules. Note cystic formations. H&E, ×100.

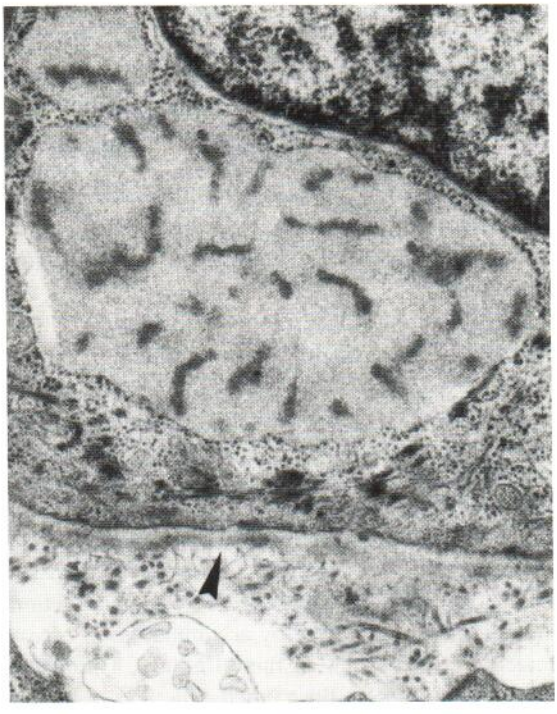

Fig. 2. Enlarged rERs with banded structures in cytoplasm of tumour cell. Note close relation to nucleus. *Arrow*: Lamina lucida and lamina densa surrounding tumour nodules. ×27,100.

Electron microscopy

The trichoepithelioma was composed of sharply delineated tumour nodules of basaloid cells with wide intercellular spaces. The nuclei of the cells located at the periphery of the tumour nodules were oriented perpendicular to the surrounding basement membrane, which measured 50 to 100 nm in thickness. The tumour cells were connected by moderate numbers of desmosomes. In the cytoplasm tonofilaments, tonofibrils, mitochondria, sparse deposits of glycogen, and abundant rER were found. In a few cells, round or ovoid elecron-dense bodies with a limiting membrane were observed. These bodies measured 150–600 nm in diameter. Especially in the cells located near the basement membrane, but also in centrally located cells, the rER was frequently enlarged, ovoid in shape and measured 1.0 to 3.7 μm in diameter (average 1.8 μm). In some areas, these enlarged rERs were surrounded by a unit membrane studded by ribosomes on the surface facing the cytoplasm. In other areas they seemed to blend with the surrounding cytoplasm. The dilated rERs were full of amorphous material of low electron density. In addition, somewhat ill-defined, finely granular, electron-dense banded structures without limiting membranes were found within the enlarged rERs. The banded structures measured 50 nm in width and some of them were arranged parallel to each other with a periodicity of 240 nm, whereas others were distributed at random. The dilated rERs with banded structures were frequently found close to the nucleus (Fig. 2). Within the tumour cell clusters, in the extracellular space, nodules containing material resembling lamina densa, collagen fibrils and cell remnants were found. These nodules were separated from the tumour cells by an ultrastructurally normal lamina densa and lamina lucida. No glandular differentiation, no cysts and no differentiation towards hair structures could be seen in the tissue prepared for electron microscopy.

COMMENT

In an ultrastructural study, Suzuki (2) mentioned in 1970 the occurrence of enlarged rERs filled with accumulation of amorphous substances of unknown origin in trichoepithelioma multiplex. In 1982, Ono et al.

described a solitary trichoepithelioma with similarly enlarged ERs, which in addition contained banded, electron-dense structures. In the case presented here, dilated rER with banded structures have been observed for the first time in a case of multiple trichoepithelioma. The findings in our case, i.e. the diameter of the enlarged rERs, the width of the banded structures and their arrangement in a periodicity of 250 nm show a striking similarity to the findings of Ono et al. (7).

Dilation of the rER is a common finding in cells of normal tissues during regeneration, repair, or during increased secretion, and is indicative of a state of high cellular activity. Under pathologic conditions, dilation of the rER may be found in the Ehlers-Danlos syndrome (8) or in diseases with rapid collagen synthesis such as scleroderma (9). Deposition of electron-dense structures in dilated rER has been noted in tumour cells with impaired transport mechanisms causing a functional imbalance between production and elimination followed by accumulation of excess material (10). In view of these findings, a probable relationship between the banded structures in trichoepithelioma and the nodular accumulations of connective tissue and material resembling lamina densa found in this tumour may be suspected. The chemical composition of the banded structures has been claimed to be an 'abnormal protein, perhaps lipoprotein or glycoprotein' (11). Nevertheless their exact chemical composition and their etiologic or diagnostic significance call for further investigation.

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