IDENTIFICATION OF SMOOTH MUSCLE MYOSIN IN MYOEPITHELIUM

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Smooth muscle myosin was found in cells of the myoepithelium of the human salivary, sweat, and mammary glands by the indirect Coons' method and a corresponding monospecific antiserum.

Myoepithelial cells are found on the inner surface of the basement membrane of the terminal portions of the salivary, sweat, lacrimal, and mammary glands. Since their discovery in the middle of the last century, they have been ascribed a contractile function [16]. Not until much later were contractions of the myoepithelium actually observed under the microscope [17]. At the ultrastructural level, fibrils have been found regularly in their cytoplasm and other structural features characteristic of smooth muscles have been observed [13, 18, 19, 21]. In recent years a group of American workers has demonstrated the antigenic similarity between the actomyosin of smooth muscles and the contractile proteins of myoepithelium [6, 7, 15]. However, the possibility of a crossed reaction because of contaminating antibodies was not ruled out in these investigations [7, 12].

The object of this investigation was to demonstrate the presence of myosin in myoepithelial cells.

EXPERIMENTAL METHOD

A monospecific antiserum against human smooth muscle myosin, obtained by immunizing rabbits by injection of the precipitation arc of myosin-actomyosin into the popliteal lymph glands [5], was used in the experiments. In the agar diffusion test the antiserum formed one band, while in sections treated by Coons' method only the muscle coat of the blood vessels of many of the organs and the smooth muscles of the esophagus, intestine, and uterus exhibited fluorescence. The submandibular, parotid, and sublingual salivary glands, the axillary sweat glands, and the mammary glands in cases of chronic mastitis were studied in autopsy and biopsy material. Frozen sections were fixed for 10 min in 96° ethanol and incubated with antiserum by the indirect Coons' method, using pure ass antibodies, labeled with fluorescein isothiocyanate, against rabbit immunoglobulin G, eluted from an immunosorbent [8]. Serial control sections were treated with antiserum previously exhausted with smooth muscle myosin, with antiserum against somatic muscle myosin, or with nonimmune serum.

EXPERIMENTAL RESULTS

In all cases specific fluorescence corresponded to the typical localization of the myoepithelium and it differed little in its intensity from the fluorescence of smooth muscles. In the breast, besides the acini and the terminal ducts, myoepithelium lined the cystic cavities with projecting polyps (Fig. 1a) and in the presence of hyperplasia it was scattered among the glandular cells or formed focal concentrations. In the salivary glands the myoepithelium consisted of a more polymorphic group of cells with numerous outgrowths running in different directions (Fig. 1b), but preserving a tendency to form circular structures (Fig. 1c, d). In the sweat glands the close connection between the myoepithelium and the inner surface of the basement membrane could be seen particularly clearly. In transverse sections fluorescent cells showed up as

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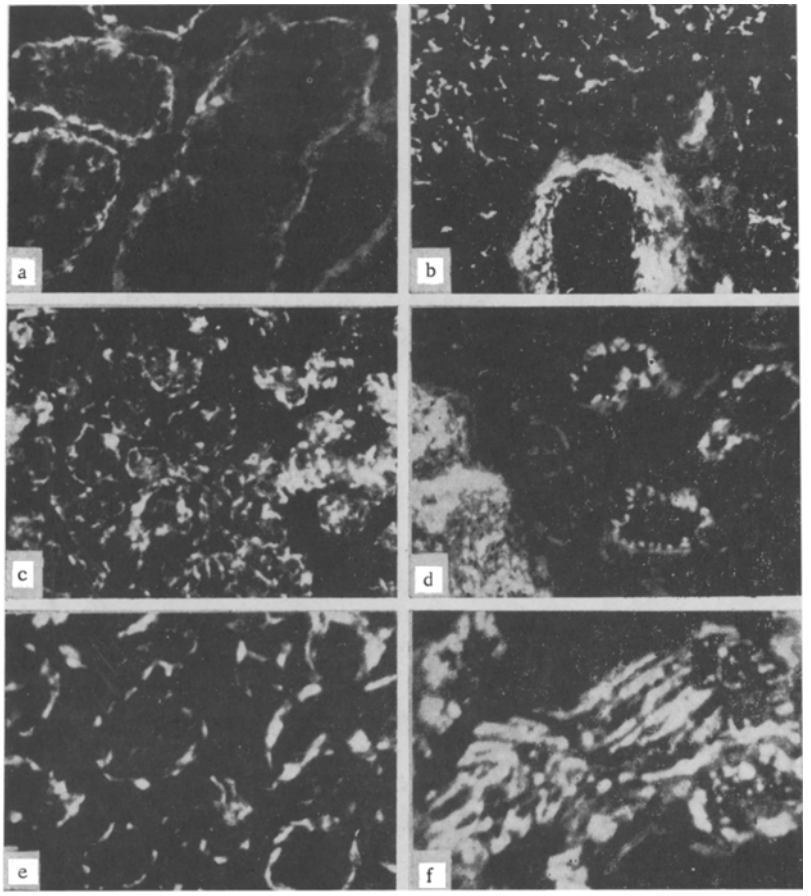

Fig. 1. Fluorescence of myoepithelium in sections treated with antiserum against smooth muscle myosin by the indirect Coons' method: a) specific fluorescence of myoepithelium along the course of the basement membrane of cystic cavities in the breast (incubation with antiserum against smooth muscle myosin, 60×); b) specific fluorescence of polymorphic myoepithelial cells and cells of the muscle coat of a blood vessel in the parotid salivary gland (incubation with antiserum against smooth muscle myosin, 60×); c) submandibular salivary gland: myoepithelium forms structures corresponding to terminal portions of gland (100×); e) sublingual salivary gland: individual cells anastomosing with each other by their appendages can be seen (200×); e) sweat gland: myoepithelium on transverse section consists of periodically repeating patterns of dots lying on the inner surface of the basement membrane; on the left, muscle coat of a large blood vessel (200×); f) sweat gland: elongated spindle-shaped cells of myoepithelium of terminal ducts (450×).

periodically repeated patterns of dots around the circumference of the glands (Fig. 1e), while in longitudinal sections they were elongated and spindle-shaped, like smooth-muscle cells (Fig. 1f).

The results described above show that the myoepithelium contains smooth muscle myosin. Since the myosin of striated and smooth muscle [3, 7] and the contractile proteins of cilia, flagella, the mitotic apparatus [10, 22] and, probably, epithelium [9] have different antigenic properties, reflecting histogenetic differences in the original tissue, it is difficult to accept the view that the myoepithelium is ectodermal in origin [18, 19]. It must rather be regarded as composed of smooth muscle cells of a special type. Difficult problems concerning the histogenesis of certain neoplasms of the skin appendages and, evidently, of other glands also [1, 2, 14, 20] can easily be resolved by the use of antiserum against smooth muscle myosin. The possibility of development of myoepitheliomas should be borne in mind in the differential diagnosis of true myogenic tumors [4, 11].

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