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GRANULAR CELL „MYOBLASTOMA"

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In 1926, *Abrikossoff* described a tumour in the tongue, and tracing back its origin to the striated muscle, termed it myoblastic myoma. Since this first report, several similar cases were reported from well-defined, non capsulated, benign growths in the skin, under mucous membranes, in the breasts, gingiva, etc. This tumour was recently called granular cell „myoblastoma".

Histologically, the tumour consists of large cells situated, among connective tissue fibres, with a foamy, clear, granular cytoplasm and round nuclei. The cells occasionally show sporadic signs of passing into longitudinal fibres. *Abrikossoff* regarded these fibres, as striated muscle fibres and the granular cells as myoblasts, or embryonic muscle-fibre elements. By the name he gave the tumour, he meant to convey its muscular origin. His theory was widely accepted; still wider, however, was the opposition it provocated.

Numerous authors, however, do not consider myoblastoma a tumour, but attribute its origin to the degeneration of striated muscle fibres *(Gray* and *Gruenfeld, Crane* and *Tremblay). Willis* regards the change as a traumatic, chemical, thermic or radiation-inflicted injury involving degenerative and regenerative phenomena. *Eickhoff, Anderson, Khanolkar* deny the muscular origin of the granular cells ; *Murray* cultured granular cell myoblastomas and found that tumour cells lost their granular quality. *Anderson* arguments against the muscular origin because the tumour frequently occurs in the skin which is free from striated muscle elements. *Feyrter*'s findings seem to point to a nervous origin ; this view is accepted by *Fust* and *Custer*, and by *Thoren* and *Ratzenhoffer*. An analysis of seven revelant cases led *Ringertz* to interpret the tumour as originating from the connective tissue and infiltrating the muscle fibres. Some authors consider the foamy, swollen cells to act as storage cells accumulating lipoids and protein *(Wegelin)*, or some mucoid like substance eventually glycogen *(Holle). Meyer, Roffo* and *Albertini* regard the myoblasts degenerated tumour cells assuming the shape of storage cells.

As can be seen from the foregoing, the muscular origin of granular cell myoblastoma has been strongly contested. The following report of a case observed by us may add fresh evidence to the yet unsolved problem of the histogenesis of the tumour.

Case report

Mrs L. B., a middle-aged woman (M. Á. V. 1798/53) had a small growth, the size of a hazelnut, removed from the inner side of her left thigh, for histological examination. It was covered by skin, compact, of fibrous texture, yellowish-white on the cut section. Under the microscope a tumour was seen in the skin, with no clear-cut contours either toward the sides or toward the epithelium. The tumour consisted of large cells with a clear, foamy cytoplasm showing acidophil granules on staining with haematoxylin-eosin. The nuclei were small, staining dark with haematoxylin and arranged in the middle of the cell or, occasionally, excentrically. The cells appeared in groups or, in long strings, among the connective-tissue fibres ; toward the periphery of the tumour, granular cells with foamy cytoplasm were few in number and occurred only sporadically between the connective tissue bundles. There was no evidence of pathological change in the epithelial layer. Histological diagnosis : granular cell myoblastoma (Fig. 1 and 2).

Further stains used, included that of van Gieson, Azan, Gömöri's silver impregnation, Haidenhain's iron haematoxylin, Unna-Pappenheim's methyl-green pyronine, light-green-eosin and water blue-orcein-eosin (Unna) ; the tumour was subjected also to fluorescent microscopy. On staining according to van Gieson the cytoplasm of the foamy cells became yellow ; Azan stained the normal epithelium a vivid red and the muscles a dark red ; the granular cells also showed a vivid red colour (Fig. 4). The silver impregnation according to Gömöri showed argent affinity of the eosinophil granules (Fig. 3.).

Haidenhain's iron haematoxylin stained the striated muscles black and the myoblast cells a greyish blue. Using methylgreen-pyronine the granules of the myoblast cells appeared in a blue colour, while with light-green-eosin, the tumour cells took a green colour, like the epithelium, against the violet background of the connective tissue. The use of Unna's stain, suitable for the demonstration of epithelial elements, corroborated our observation that the myoblastic cells and the epithelium assume an identical pale-violet blue, contrasted by a vivid blue environment.

Each of the staining methods applied has proved, that *Abrikossoff*'s granular myoblast cells show affinity to the same stains as the ectodermal elements, the squamous epithelium of the skin and the epithelium of the ducts of accessory glands. For fluorescent microscopy the sections were treated with various fluorochromes. On treatment with Haitinger II, Coriphosphin and Rhodamine B ectodermal elements, such as the epithelium, the epithelial cells of the excretory gland ducts and the granular cells, gave fluorescence of an identical colour. E. g. Haitinger's stain sharply contrasted the yellow fluorescence of the myoblastic cells and ectodermal elements against the greenish-blue fluorescence of the collagen connective tissue bundles (Fig. 5). Stained with Rhodamine B, the epithelium, the gland ducts and the myoblast cells fluoresced with a red colour amongst the blue collagen bundles. Flavophosphin imparted a yellow fluorescence to the connective tissue and a brown one to the myoblast cells and the ectodermal elements.

Treating, as a control, normal striated muscle with the fluorochrome dyes mentioned, we found the fluorescence of the granular cells to differ from the green one, given by the striated muscle and to be the same as that of the epithelial layer of the normal skin. Subjecting the spinal cord and peripheral nerve fibres to the same treatment, fluorescence was green in the gray matter of the spinal cord and brownish-red in the fibres of the myelin sheath ; these nerve elements, accordingly, show a fluorescence differing from the yellow one given by the myoblastic cells.

Summarising our histological and fluorescence tests it is suggested that the granular cells occurring in myoblastic myoma show the same staining properties as ectodermal elements.

There are certain data in the literature on granular cell myoblastoma in favour of the tumour's epithelial origin.

In 1894 far in advance of *Abrikossoff*, *Massin* had attributed epithelial origin to a tumour growing from the gingiva, with its cells closely resembling the myoblastic cells described later. According to *Leroux* and *Delarue*, the similarity of granular and epithelial cells greatly exceeds the similarity between epithelial cells and muscle elements. In one third of his 7 cases reported, *Lauche*

observed marked proliferative activity in the epithelium covering the tumour with an occasional tendency towards cancroid degeneration and, that the tumour cells occurred in the area between the epithelium and the muscles, an area where are under normal conditions, no muscle-elements. In his view, the tumour cells drift towards the muscles and infiltrate the muscle fibres. In none of his cases was he able to demonstrate a close connection with the muscles. The high degree epithelial proliferation, also observed by other authors, led *Lauche* believe, that the phenomenon was the reaction of the epithelium to substances stored in the cells. The frequent occurrence of tumour-cell-like foamy cells, beside epithelial elements, in sections from embryos in the first weeks intrauterine life led *Klinge* to trace back the origin of the tumour cells to the »skin-muscle plate« present at. *Kleine* considered congenital epulis, belonging histologically to the same class, as a basal cell tumour originating from the salivary gland.

Our own investigations tend to verify these sporadic data. Granting, that staining and fluorescence tests provide reliable guidance as to the origin of any type of cell, our findings seem to prove that the granular cells of *Abrikossoff*'s myoblastic myoma, which stain and fluoresce identically as the epithelium of the skin and of the glands, are ectodermal elements. Identity of staining does not yet necessarily imply identity of chemical constitution. There is however, no reason why a difference in staining should not point to a difference in structure as well *(Leupold)*. Accordingly granular cell myoblastoma, though its origin has not yet been clarified may, in all probability be regarded as a benign epithelial tumour.

Summary

A small growth removed from the skin of the left thigh of a middle-aged woman, showed the histological picture of *Abrikossoff*'s myoblastic myoma (granular cell myoma). Examining the tumour by means of different stains and fluorescent microscopy, the granular cells (myoblasts), held to be embryonic muscle elements by *Abrikossoff*, were observed to show a behaviour d fferent from that of mesodermal elements, striated muscle fibres, connective tissue and nerve elements. The granular cells have been proved to stain and fluoresce identically with epithelial elements. The findings point to the ectodermal origin of granular cell myoblastoma.

REFERENCES

1. **Abrikossoff:** (1926) Über Myome ausgehend von der quergestreiften willkürlichen Muskulatur. Virch. Arch. *260*, 215. — (1931) Weitere Untersuchungen über Myoblastenmyome. Virch. Arch. *280*, 723. — 2. **Albertini:** cit. Holle. — 3. **Anderson:** (1948) Pathology St. Louis. Mosby. 799, 1250. — 4. **Crane** and **Trenblay:** (1945) Myoblastoma, granular cell myoblastoma or myoblastic myoma. Am. J. Path. *21*, 357. — 5. **Eickhoff:** (1939) Myoblastenmyom und Carcinom. Virch. Arch. *304*, 432. — 6. **Feyrter :** (1952) Über die granulären Neurome (sag. Myoblastenmyome). Virch. Arch. *66*, 322. — 7. **Fust** and **Custer:** (1940) On the neurogenesis of so called granular cell myoblastoma. Am. J. Clin. Path. *19*, 522. — 8. **Gray** und **Gruenfeld:** (1937) Myoblastom. A. J. Cancer *30*, 699. — 9. **Holle:** (1941) Über die Deutung der sogenannten Myoblastenmyom als Speicherzellgeschwülste auf Grund einer besonderen färberischen Reaktion.

Zbl. allg. Path. u. path. Anat. *76*, 244. — 10. **Khanolkar:** (1947) Granular cell myoblastoma. Am. J. Path. *23*. — 11. **Kleine:** cit. Lauche. — 12. **Klinge:** (1928) Über die sogenannten unreifen, nicht quergestreiften Myoblastenmyome. Verh. d. D. Path. Ges. *23*, 376. — 13. **Lauche:** (1944) Sind die sog. «Myoblastenmyome» Speicherzellgeschwülste? Virch. Arch. *312*, 335. — 14. **Leroux et Delarue:** (1939) Sur trois de tumeurs a cellules granuleuses de la cavité buccale. Bull. Assoc. Franc. étude. cancer *28*, 427. — 15. **Leupold:** (1918) Untersuchungen über die Mikrochemie und Genese des Amyloid. Beitr. Path. Anat. *64*, 347. — 16. **Massin:** (1894) Ein Fall von angeborenem Epitheliom entstanden aus dem Schmelzorgan. Virch. Arch. *136*, 328. — 17. **Meyer:** (1933) Myoblastentumoren («Myoblastenmyome» Abrikossoff) Virch. Arch. *287*, 55. — 18. **Ratzenhoffer:** cit. Feyrter. — 19. **Ringertz:** (1942) Über das sog. Myoblastenmyom, mit Beschreibung 8 neuer Fälle. Acta Path. microbiol. Scand. *19*, 112. — 20. **Roffo:** cit. Lauche. — 21. **Wegelin:** (1947) Die Natur der sog. Myoblastentumoren. Schweiz. Z. allg. Path. *10*, 631. — 22. **Willis:** (1948) Pathology of tumours. Butterworth. London p. 743.

«МИОБЛАСТОМА» С ЗЕРНИСТЫМИ ШАРАМИ

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Из кожи левого бедра женщины средних лет был удален комок величиной в орех; гистологическая картина этого комка оказалась идентичной со структурой миобластной миомы (миобластома с зернистыми шарами) Абрикосова. При исследовании опухоли различными методиками окрашивания, далее и при помощи флуоресцентной микроскопии, автор наблюдал, что зернистые шары (миобласты), рассматриваемые Абрикосовым как первичные элементы мышцы, проявляют поведение, отличающееся от поведения элементов мезодермы, поперечнополосатых мышечных волокон, соединительной ткани, а даже от поведения нервных элементов. Автор устанавливает, что зернистые шары окрашиваются и флуоресцируют как элементы эпителия. На основе полученных результатов автор приходит к тому заключению, что миобластомы с зернистыми шарами эктодермального происхождения.

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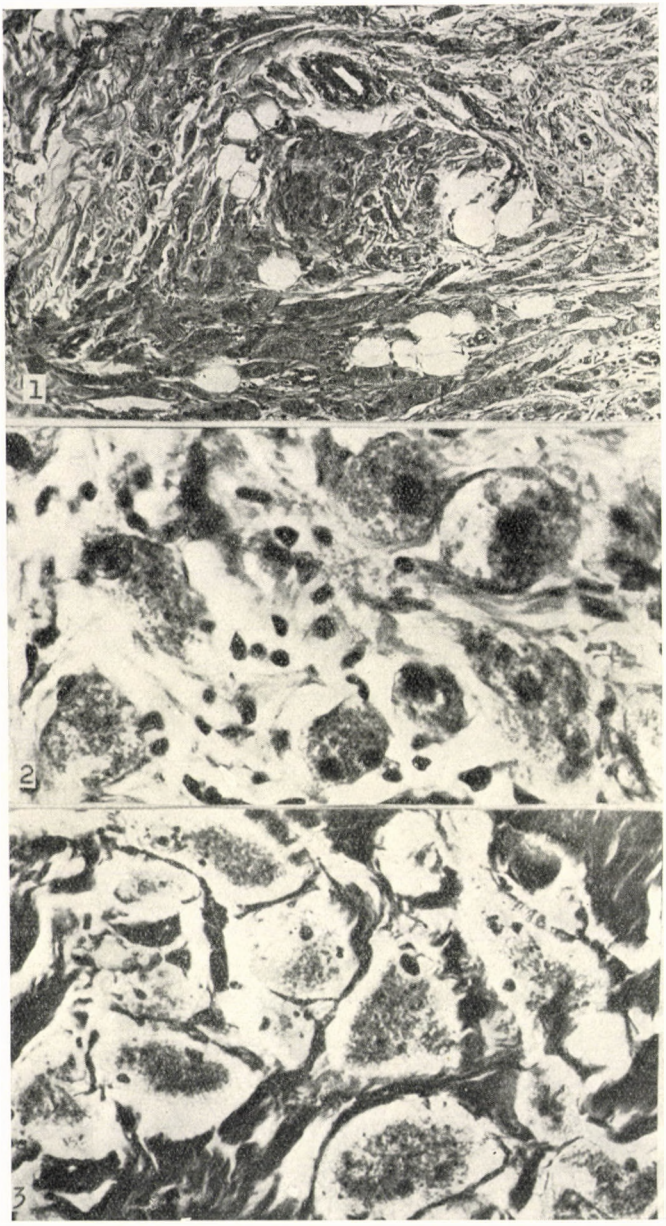

Fig. 1. Granular myoblastic cells arranged in string shape among connective tissue fibres
Fig. 2. Greatly enlarged view of granular cells (stained with haematoxylin-eosin)
Fig. 3. Gömöri's silver impregnation brings out the coarse and fine granules of the myoblast cells with sharp clarity

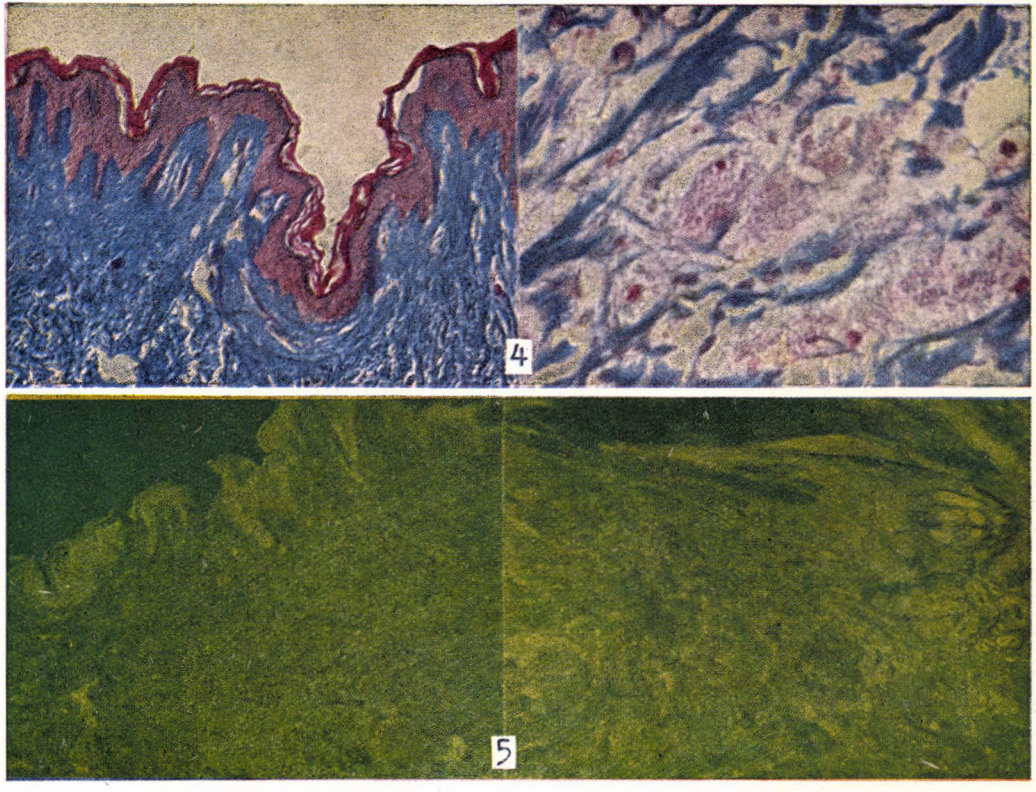

Fig. 4. Left: the multilayer squamous epithelium of the sound skin stains bluish-red with Azan; Right: the granules of the myoblast cells respond to Azan with the same colour

Fig. 5. Fluorescence microscopy after treatment with Haitinger II, Left: the epithelial layer of the skin appears yellow differently from the green fluorescence of the connective tissue. A similar yellow fluorescence is emitted by the epithelial cells of the gland ducts and by the granular cells