ELECTRON-MICROSCOPE DIFFERENTIATIVE DIAGNOSIS OF BRAIN TUMOURS. HISTOLOGICALLY DETERMINED MENINGEOMA WITH ULTRASTRUCTURAL CHARACTERISTICS OF EPENDYMOBLASTOMA

N. Deleva

Electron-microscope criteria for differentiative diagnosis of brain tumours (BT) including meningeomas and ependymomas are shown in their ultrastructural characteristics worked out by S. Luse in 1960 (9). Later, Czerniak B. et al., Escourolle, Fr. Haguenau, J. Hess, A. Hirano, J. Kepes, Romodanov and some others add new data proving that the electron-microscope method (EMM) has both, theoretical importance for the histogenetical investigation of BT, as well as practical significance — for a precise differentiative diagnosis (1, 2, 3, 4, 5, 6, 7, 10).

We could not find data in the available literature concerning meningeomas requiring a EMM-differentiative diagnosis of ependymoblastomas. In our present work we study such a tumour, which ultrastructural determination was at first ependyma-like, but its signs of malignancy required a retrospective light-microscope investigation, change in the initial histological opinion and as a result — final diagnosis "ependymoblastoma" instead of the initial one "meningeoma".

Materials and methods

The material for EMM-study was taken in the course of operation, worked by the routine method and by using the ultramicrotom "Reichert" ultrathin cuts were performed; the latter were stained with uranylacetate and plumbic nitrate, after which they were examined under the electron microscope JEM-7A.

Results and discussion

When the ultrastructural elements of the ultrathin cuts were studied the following was established: zonule adherentes, wider intercellular spaces with microvillae, basal corpuscles, cilia. The tumour tissue was built of large, oval or slightly elongated cells, in groups of several cells together. It could be seen that the cell surface was considerably curled with many microvillae and small cytoplasmatic projections. Quite often zonule adherentes was established — not straight, wavelike, connecting neighbouring cell projections. There the intercellular spaces were wider, oval, filled with tough-distributed and variously orientated microvillae and rarer typical cilia with basal corpuscles in their cytoplasma. Along the rest part of the cell periphery the intercellular spaces were equally wide with single points of neighbouring to the nearer cell membranes without desmosomes or dense components. At certain places there was a tendency of separation of some cells from the rest ones: large parts of

the cell surface were in contact with very wide, optically empty intercellular spaces. Even not so often, there were cells which did not contact with the others at the cut level. Their cell periphery was represented by a concentric zone, variously cut small projections and microvillae.

The cell nuclei were somehow larger at the background of the smaller perinuclear cytoplasmatic zones. They were often oval or slightly elongated with curling of their contours. The dense chromatin shew a rough spot-like distribution in the caryoplasma and its marginal end was severed. The nucleoli were oval, relatively large, with mainly expressed granular part and spotty brightenings. Ordinary nuclear corpuscles were also detected. Mitotic figures were found too.

Mitochondria with dark matrix, single ergastoplasmatic canals, free rhibosomes, Goldgi apparatus, lysosomes, glycogeric granules were established in the cytoplasma. Some collagenic fibriles were detected around certain cells.

The basic complex of ultrastructural features as a criterion for identification of neoplastic cells with ependymic origin is the following: connective components between cell membranes, microvillae at the apical pole of the cells, cilia and basal corpuscles on the cell surface or in the cytoplasma (less differentiated tumours). The importance of the aforementioned criterion (6, 9) for the ultrastructural differentiative diagnosis confirms Romodanov who accepts that submicroscope organospecific signs of BT are the most significany morphological markers of ependymoma. Studying 14 tumours, histologicallt determined as ependymoastrocytomas, the authors agree with the ependymic character of these tumours based on the cited opinion (1). All elements of this complex are manifested in the investigated by us tumour tissue.

I t is worth-mentioning that there was not a systematic order of the cells in the tissue. The apic pole and lateral borders of the cells were variously orientated, based on the wider intercellular spaces filled with microvillae and surrounded by projections connected to zonule adherentes. Besides, similar microvillae were detected along greater part of the cell periphery.

The investigation of ependymomas with a high-voltage electron microscope reveals out that the apic cell surfaces are totally covered by a layer of mainly perpendicullar-orientated towards the surface microvillae (8). This finding is in coordination with our established perinuclear zone rich of small projections and microvillae; however, it is not selectively apic-located.

The absence of a characteristic organ-like order together with prevailing of the nucleus in nucleo-cytoplasmatical relation and the present mitotic figures give us enough proof to accept that it is a question of ependymic tumour with signs of malignancy — ependymoblastoma. In the studied material we established relatively rare cilia, but this was earlier found by other authors and can be explained by variations in the complex of the surface organells (8).

Considerable differences between the investigated tumour and meningeomas must be pointed out. Typical cytoplasmatic interdigitations for meningethelial meningeomas were not detected, as well as desmosomes, cytoplasma rich of organells and tonofillaments, etc. Similarity with the fibroblastic variant of meningeomas was also out of discussion because the elongated spindle-like cells with well developed ergastoplasma and excess of collagen around them were missing (1, 7, 9, 10, 11).

The interdigitative cytoplasmatic projections form a set of relatively narrow projections and wide intercellular spaces in some regions of the menin-

othelial meningeomas, without desmosomic formations. In these cases the similarity with small projections and microvillae of the cited cells could be discussed. The rare and isolated finding of those regions could be a possible difficulty (problem) for the EMM-diagnosis. However, there exist certain peculiarities, which can assist additionally the differentiative-diagnostical criterion. First — the zone which these projections fill is bigger with the meningeomas, sometimes even bigger than the perinuclear cytoplasma, whereas with the ependymomas it is more narrow and almost concentrically located around the cell periphery. The order of the projections with meningeomas is not systematic; it is setlike, often concentrical and there are certain tendencies for a parallel order. Second — whereas with meningeomas and their cytoplasmatic projections, in spite of their narrowness, are detected different organells, with ependymomas are established only single, parallel to the axis microfibriles. Three — the visual picture of distribution of dense chromatin differs to the usual one of the meningeoma cells, whose structure is finer and the distribution — properer. The rough heterochromatin spots are not detected with meningeomas and the marginal layer is almost compact everywhere.

In conclusion it must be pointed out that in coordination with the cited opinions of various authors the significance of the ultrastructural elements, such as microvillae, zonule adherentes, cilia and basal corpuscles, is very important for the identification of cells with a potential ependymical origin. In our case, for example, the EMM-investigation of specimens of biopsy-taken tumour tissue is undoubtfully necessary for the more precise morphological diagnosis.

The ultrastructural study of BT gives a possibility, as in our case, to determine some features of malignancy, difficult to analyse at histological level only.

The defined additional ultrastructural criterion for differentiation of cytoplasmatic projections of meningeal and ependymeal tumours can certainly be helpful with some cases of meningothelial meningeomas, where a few typical desmosomes are established in comparison with the greater number of zonule adherentes, cilia and basal corpuscles, even as a rarer finding.

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ЭЛЕКТРОННО-МИКРОСКОПИЧЕСКИЙ ДИФФЕРЕНЦИАЛЬНЫЙ ДИАГНОЗ ОПУХОЛЕЙ МОЗГА. ГИСТОЛОГИЧЕСКИ ВЫЯВЛЕННАЯ МЕНИНГИОМА С УЛЬТРАСТРУКТУРНОЙ ХАРАКТЕРИСТИКОЙ ЭПЕНДИМОБЛАСТОМЫ

Н. Делева

РЕЗЮМЕ

С помощью электронного микроскопирования была изучена выявленная при гистологическом исследовании менингиома. Были обнаружены характерные для эпендимомы ультраструктурные особености опухолевых клеток. Отсутствие характерного расположения клеток, структура хроматина и обнаруженные митотические фигуры говорят о злокачественной природе опухоли. Ретроспективное исследование с помощью оптического микроскопа подтвердило диагностицированную уже эпендимобластому. В работе детально обсуждается различия и сходства, установленные при сопоставительном исследовании менинготелиальной менингиомы и эпендимобластомы.