ELECTRONMICROSCOPICAL INVESTIGATION OF THE SMALL NEURONS IN TRIGEMINAL GANGLION

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SUMMARY

Trigeminal ganglion (TrG) in its essence represents gathering of pseudounipolar neurons, situated in trigeminl impression of the petrosal part of the temporal bone, wrapt in connecting tissue "sleeve" of trigeminal cavity of the dura and aracknoid maters in vicinity to back end of cavernous sinus. Peripheral tentacles of pseudounipolar cells participate in formation of the first, second and receptive part of the fifth cerebral nerve, and central tentacles form the receptive root entering in middle cerebellar peduncle aside the brainstem.

Key words: receptive cells, small neurons, trigeminal ganglion, pseudounipolar neurons.

INTRODUCTION

Trigeminal ganglion (TrG) is formed by pseudounipolar cells, satellite cells and their tentacles.

Ehrlih(1886) and Dogiel(1896) used methylene blue for stainig, and using silver impregnation methods as that of Golgi(1898) and Bielschowsky(1907) confirmed pseudounipolar form of sensitive ganglia neurons. Altman and Bayer(1982) consider origin of sensitive ganglia cells, from the crest. Chan and Tam(1988) accepted later that the ectodermal placodes give rise of these cells Davies and Lumsden(1990) describe the development of (TrG) confirming its origin from neuronal crest and ectodermal placodes. Pseudounipolar neurons in (TrG) were described cytologically by Retzius(1880). Cells in the (TrG) vary in rather wide range of size of the same individual, so in the (TrG) of different species. Cells sizes vary from 10 μm to 110 μm. Perikarya present various forms: predominantly round, but cells with ellipsoid forms were described by Hatai(1901),and quated by Bunge et al.(1967).

Goals and tasks

Goal of this presentation is to investigate human cytoarchitectonic and ultra-structure of (TrG) and presentation of small neurons using electron-microscopy.

Goals to perform are:

Electron microscopic investigation of human (TrG).

MATERIAL AND METHODS

Investigations were conducted with 20 couples of human (TrG) presented by different age of range from 21 to 82 years.Human sample was supplied by Department of Forensic Medicine and Deontology and Department of Patology. The samples was prepared for standard microscopy by standard method.

RESULTS

A monotonous cell picture, is displayed in greater percent (over 80%) by small and middle size pseudounipolar cells. Observing more carefully, there are cells with variety of forms (round, ellipse, polygonal and elongated) which could be seen. Size of cell's body varies as well in width. They differ in characteristics of their nuclei and cytoplasm, and their correlation as well.

Ultrastructure of ganglia trigeminale

In respect to this subdivision of neurons positioned in (TrG) each group of small neurons can be described separately.

Small light neurons

They are smallest neurons in the structure of (TrG). Their size is 10 – to 13 microns, and they have scares cytoplasm (compared with other groups of neurons), and great number of cell' organelles.

Small dark neurons

Greater part of these groups of neurons have size like 12 -15 micrometers. They could be met in all three parts of (TrG) with equal frequency, but in the area of (TrG), responsible for separating of mandibular nerve, there are small groups of 2 – 5 neurons. Ratio nucleus/cytoplasm is from 1:1,4 to 1,2. This is one of the reasons, which in the past they were considered as artifacts, sequence of bad preparation of the sample or a cell in degeneration state. Their shape is round, elliptic, fusiform, and with irregular contour of perykaria. Using these criteria we could divide them into two subtypes. The first type is presented by Nills granules with bigger size , and the second with smaller size.

Discussion

Discovering cytoarhitectonic picture of (TrG) is in direct dependence from used methods. Despite multiple investigations with electron microscopic method (Stoyanova I.,2004; Wang H., Wei F., 2006), there are still some omissions in cytological aspect.

We made classification of the small neurons according to the form of the their perykarions and the cytoplasmic pigmentation.

1. Small light neurons
2. Small dark neurons
3. Neurons with elongated body cell
4. Neurons with polygonal body cell

Based on the classifications we used for the neurons in (TrG) from authors working on the problem i.e. Korner 1937, Andres 1961, Carmel and Stein and Lieberman 1976. We established that not every one of them is full and thorough and because of that we created a classification combining the knowledge of above mentioned authors, which devides neurons according their size, shape and the presence of cytoplasmic organel. We present only the part from the classification responsible for the small neurons.

In the following researches which we have appointed as our task thru the methods of morpholody we will follow the zones for which the neurons are responsible described in the article.

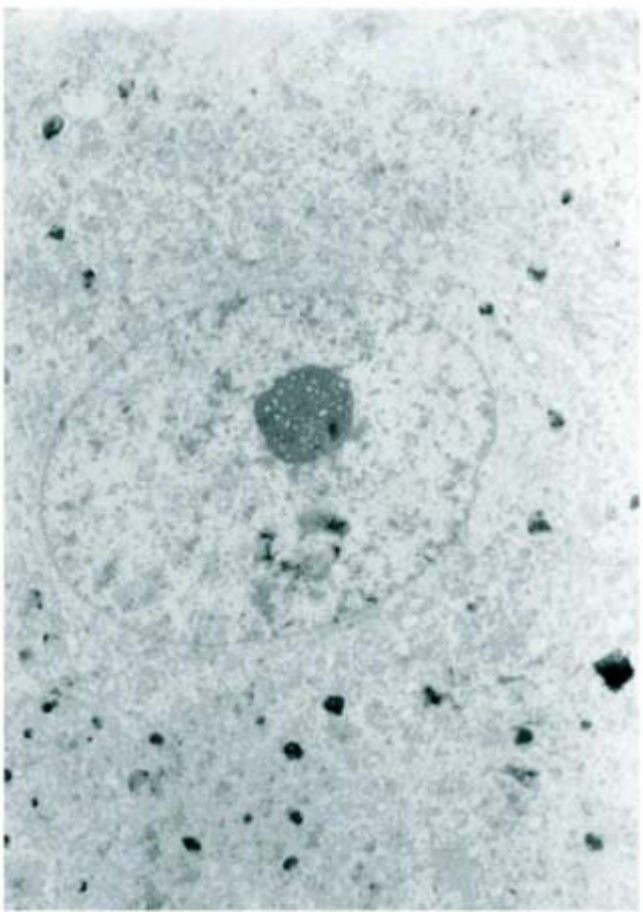

Fig. 1. Picture of small light neuron with presence of pigment. x 9000.

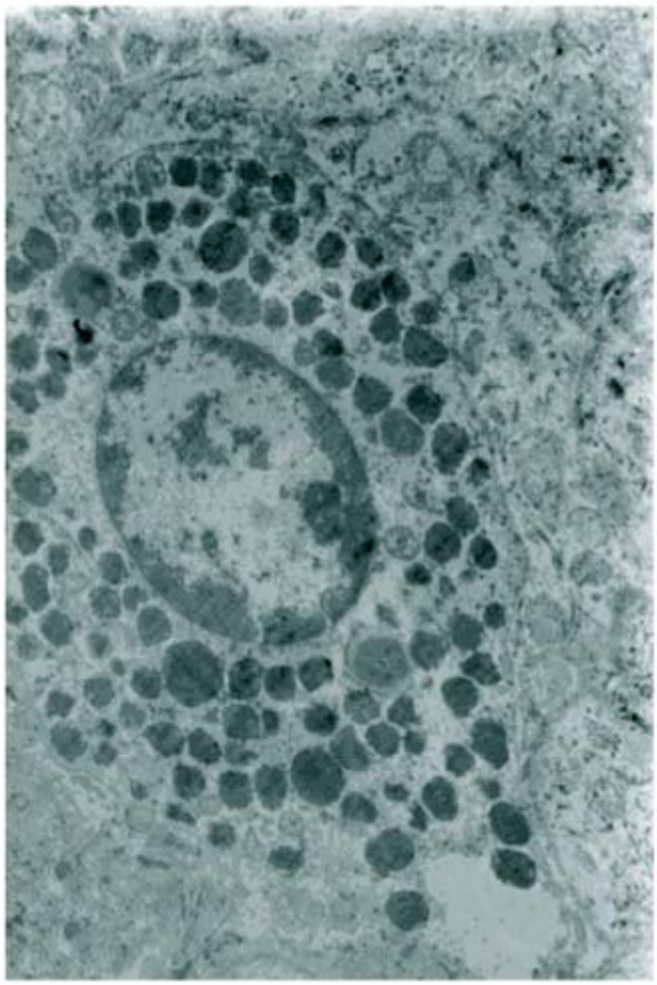

Fig. 2. Small dark neuron with diffused pigment. x 9000

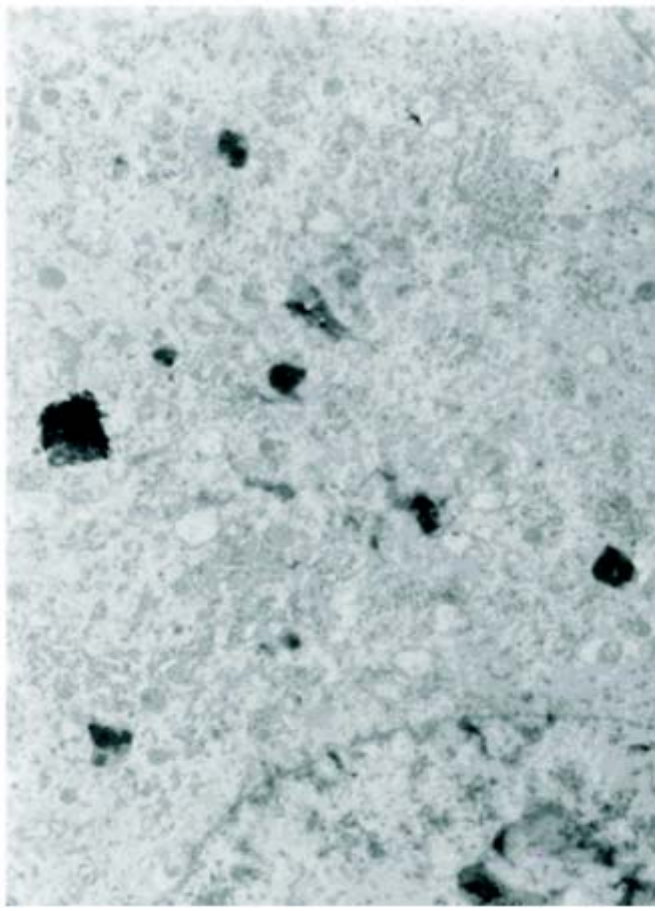

Fig. 3. EM. picture of small dark neuron from human with presence of pigment. x 12000.

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