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LIGHT – MICROSCOPIC STRUCTURE OF TRIGEMINAL GANGLION IN HUMANS

Dimo Krastev, A. Paloff, D. Hinova-Palova, A. Apostolov*, W. Ovtscharoff
Department of Anatomy and Histology, Preclinical University Center,
**Department of Forensic medicine and deontology,*
Faculty of Medicine, Medical University, Sofia, Bulgaria

ABSTRACT:

Neurons in the trigeminal ganglion (TG) that are different in size have been visualized using light-microscope methods. Pseudounipolar neurons in trigeminal ganglion are sensory cells. The trigeminal ganglion is a main generator of information from the orofacial complex in the human as well as in different types of mammals. In conclusion, trigeminal ganglion is a related station that receives information, arranges it and transmits the signal to the brain.

Key words: trigeminal ganglion, pseudounipolar neurons, sensory cells**,** cytoarchitectonic.

INTRODUCTION

Investigations of the sensory ganglia confirm their similarity in cytoarchitechtonic aspect. The authors working on the problems of the trigeminal system and especially on (TG) in cats Allen (1924) and monkeys Maxwell (1967) in their studies on ultrastructural level show that the (TG) is a limitant zone situated between the central and the peripheral nervous systems.

From the systemical studies on ultrastructural level it is clear that in all sensory ganglia there are two types of neurons: large and small, light and dark. The large neurons in (TG) have a light cytoplasm due to the fact that Nissl bodyes are represented by small diffusely-situated isles of small cysterns of the rough endoplasmic reticulum. In percentage the light neurons are considerably higher in comparison with the dark.

The darker colour of the small neurons is due to the fact that the Nissl granules are represented by bigger isles composed by the longer cysterns of the rough endoplasmatic reticulum and dispersed free ribosome in between them. Imunohistochemistry it is proven that 46% of the small and medium-sized neurons situated in the (TG) are immunoreactive and have a darker color in tested animals (Ichikawa et al. 2006). The differentiation of the small and dark neurons begins later during the ontogenetic development.

Stoyanova (2004), Stoyanova, Lazarov (2001) studying the vegetative ganglions of an animal. The experimental studies of different types of animals are a basis for known histologist like Cajal, Nissl, Cox, Lugaro and others to "classify the ganglion cells according to the differences in the repartition of the Nissl granulations, later called type A and type B. (Andres 1961).

On histological section it is visualized that the perikarya of the pseudounipolar cells are tightly enveloped by small satellite cells with tightly linked neurolemmas. They are called satellites by Cajal (1907). The description of primary sensory neurons in the (TG) and the bulbus is seen in the works of Cajai (1907), Lazarov (2002), Marani and Usunoff (1998). Studying the structure of the human (TG) Komer (1937) on the base of different impregnation techniques makes it an objective to classify them as:

1. Large cells with light cytoplasm.
2. Large cells looking light-microscopically with granulations.
3. Small cells with light cytoplasm.
4. Small cells with dark cytoplasm.

The aim of the study is to establish the cytoarchitecture of the (TG) in human.

MATERIAL AND METHOD

The material is taken from the Pathology department. The studies have been carried out on 5 (five pairs of (TG)) of people of different age between 35 and 45 years. The tissue samples are embeddet into paraffin and are cut into slices of 20 μm. The colorations are H&E and Azan.

RESULTS

The finding of the cytoarchitectonic picture of the trigeminal ganglion is in direct correlation with the used methods.

1. Light-microscopic study of trigeminal ganglion

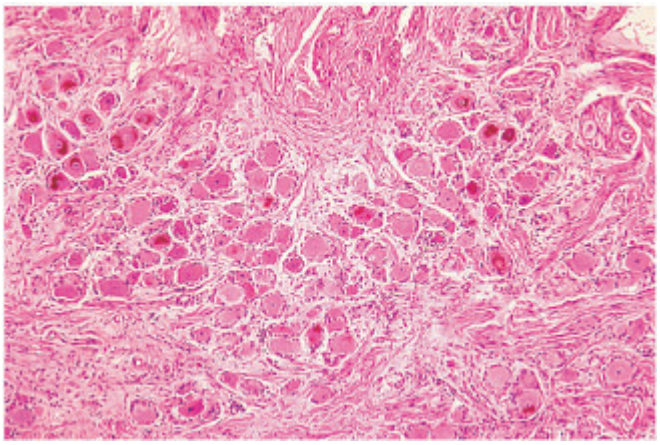

Fig. 1. Pseudounipolar neurons with different size.H&E x 100.

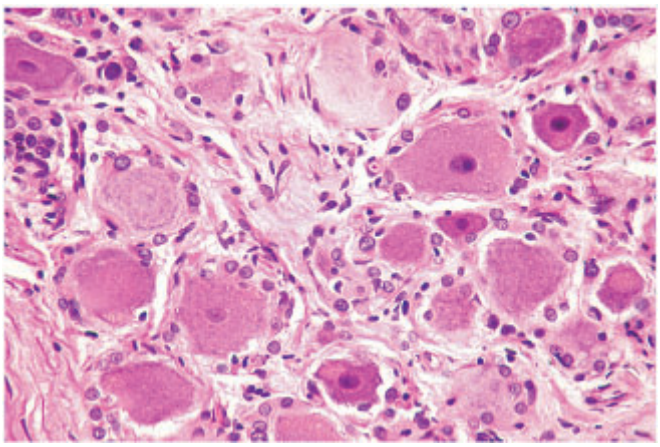

Fig. 2. Different size neurons can be observed and in some of them is seen an accumulation of a pigment. H&E x 250.

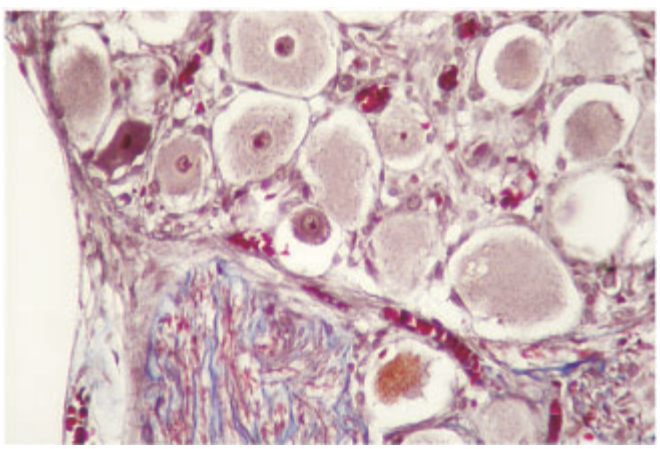

Fig. 3. There are seen neurons of a different size. Azan x 250.

In order to be able to represent a stricter classification of the neurons in the complicated cytoarchitechtonic picture of the trigeminal ganglion we have used hodologous methods.

We differentiate the following types of neurons according to their shape and the size of their perikarya:

1. Large light neurons
2. Medium light neurons
3. Medium dark neurons
4. Small light neurons
5. Small dark neurons
6. Neurons with elongated body
7. Neurons with polygonal shape

The medium sized neurons are the largest population of diffusely situated neurons in the (TG). Their perikarya is oval. The nucleus is situated approximately in the centre of the cytoplasm and also has an oval shape. According to the color of the cytoplasm they can be divided into two types: medium light neurons with light cytoplasm and medium dark with darker cytoplasm.

The large light neurons are situated near the places where the three branches of the trigeminal nerve exit. They are typical pseudounipolar neurons with light cytoplasm and big hypochromic oval nucleus. The small neurons are situated everywhere and are also divided into light and dark according to the color of their cytoplasm. They have a defined nucleus with slight1y oval shape situated excentrically.

There could be seen neurons with polygonal shape which are medium in size, but could be found bigger situated mainly centrally and sometimes in the first segments of the three branches of the nerve. There are neurons with long cell body.

DISCUSSION

In general our study is in agreement with the resu1ts of numerous authors working on animals and human.

The sensory nerve cells situated in trigeminal ganglion known as pseudounipolar or unipolar neurons are situated on the path between the receptors and the central nervous system. The ganglion serves as a relay station which is reached by rich information from the periphery to be resend on a higher level and to be transformed in a conscious perception on the level of the cerebrum.

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Address for correspondence:
Dr Dimo Krustev
Department of Anatomy and Histology, Preclinical University Center,
Faculty of Medicine, Medical University,
2, Zdrave str., 1431; Sofia, Bulgaria
Phone: 00359 2 856 74 81; Mobile: 00359 899 701 644;
E-mail: dimo_krustev@yahoo.com;