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Morphological Features of Dogel's First Type Neurons In the Ganglia of Gallbladder Wall

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ABSTRACT
The common bile duct contains a large number of nerve elements, it contains the largest ganglia with many neurons. Among the neurons of these ganglia, it is difficult to differentiate Type I Dogel cells. The aim of the study was to identify some morphological features for the identification of Dogel type I nerve cells in the intramural ganglia of the common bile duct in dogs. Neurohistological impregnation research methods were applied. It has been established that around the bodies of nerve cells of type I Dogel there is always a clear space free from nerve fibers and often even from gliocytes. A feature of Type I Dogel cells is also the intense perception of silver nitrate during impregnation (hyperimpregnation) in comparison with other neurons of the node.

The biliary system is the most richly supplied with nerve elements section of the digestive tract. This is due to the complex function and presence of a complex of sphincters that ensure the flow of bile into the duodenum during digestion and accumulation in the gallbladder outside the moment of digestion. Apparently, this is the reason for the attention of researchers to studying the innervation of this system in humans [1,7] and in laboratory animals [2,3,4,5,6.8]. In the intramural nervous apparatus of the digestive tube organs, three types of Dogel nerve cells are distinguished. Type I nerve cells (long-axonal neurocytes) are motor neurons of the autonomic nervous system, which are involved in regulating the functions of the muscle layers and membranes of internal organs. A characteristic morphological feature of these neurons is the presence of long and thick, compared to other processes, axons, and many short dendrites. Of the sections of the biliary system, the common bile duct is the richest in nerve elements; it contains the largest ganglia with many neurons. Among the neurons of these ganglia, it is difficult to differentiate Dogel type I cells (especially in cases where their axon is not visible). At the same

time, identification of the typological affiliation in the composition of the intramural nervous apparatus is necessary to assess the degree of motor and sensory activity of this organ or its certain parts. Analyzing many micro slides of the gallbladder and extrahepatic bile ducts, we drew attention to a new morphological feature of the location of these neurons.

Purpose of the study. Identification of some morphological features for the identification of Dogel type I nerve cells in the intramural ganglia of the common bile duct in dogs.

Material and research methods. The intramural nervous apparatus of the common bile duct was studied in 8 practically healthy dogs. Animals were removed from the experiment under anesthesia, strictly observing the rules of bioethics. The common bile duct, taken immediately after the slaughter of animals, was fixed in 12% neutral formalin. During the fixation process, the formalin pH was periodically checked, and impregnation began at the first pH shift to the acidic side. Cryostat sections of the material were impregnated according to the Bielshovsky-Gros and Campos methods.

Research results. The gallbladder and extrahepatic bile ducts are richly supplied with nerve elements. The intramural nervous apparatus of this system consists of nerve ganglia containing several neurons to several dozen nerve cells and bundles of nerve fibers of different calibers. The largest nerve ganglia and large bundles of nerve fibers are found in the wall of the common bile duct. The nodes contain all three types of autonomic neurons (Dogel type I, II, III nerve cells). The intramural nervous apparatus of the common bile duct contains relatively more type I nerve cells (long-axonal neurocytes). The main distinguishing feature of these neurons is the presence of a relatively long, thick axon and many short, highly branched dendrites. Based on this morphological feature, type I neurons are easier to identify in cases where they are located singly and within the microganglia of a limited number of neurons (Fig. 1).

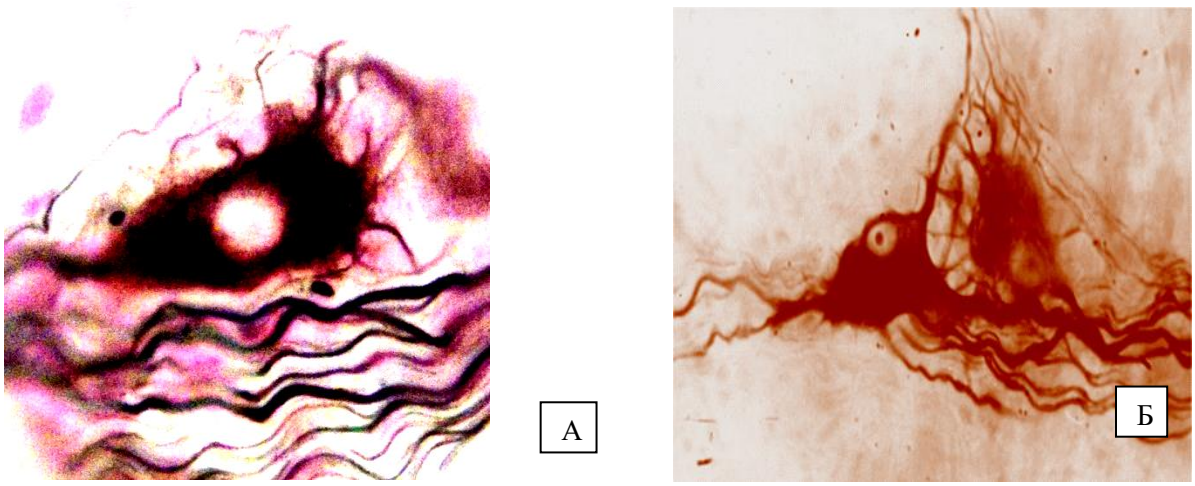

Fig.1. Dogel type I and II nerve cells. A – single located type I cell; B – adjacent cells of type I and II. Impregnation according to Bilshovsky-Gros. Vol.20, approx.10.

Within large ganglia, if the axon is not visible, it is difficult to differentiate neurons of this type. Analyzing numerous micro specimens of the common bile duct of a dog, we drew attention to the fact that around the bodies of Dogel type I nerve cells, where its dendrites are located, bright space is almost always found, free from nerve fibers and often even from gliocytes (Fig. 2). Nerve fibers that come close to other neurons of the node, as it were, “bypass” the body of Dogel type 1 neurons. Another feature of Dogel type I cells, in our opinion, is the

intense perception of silver nitrate during impregnation (hyperimpregnation) compared to other neurons of the node. This is why they are always intensely colored and look darker.

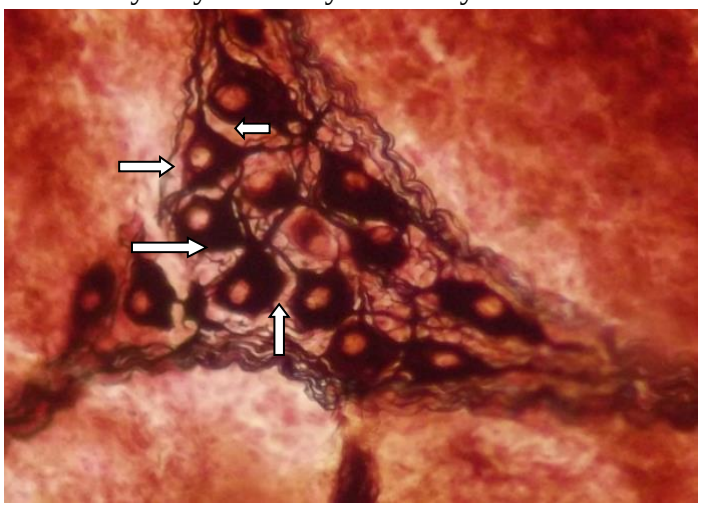

Fig.2. Free light space around the bodies of intensively impregnated and nearby Dogel type I nerve cells in the intramural node of the common bile duct (indicated by arrows). Impregnation according to Bilshovsky-Gros. About. 20, approx. 10.

This is clearly noticeable when these cells are located in large ganglia, among many densely located nerve cells. Against the general dark background, a light space is clearly visible around these cells (Fig. 3).

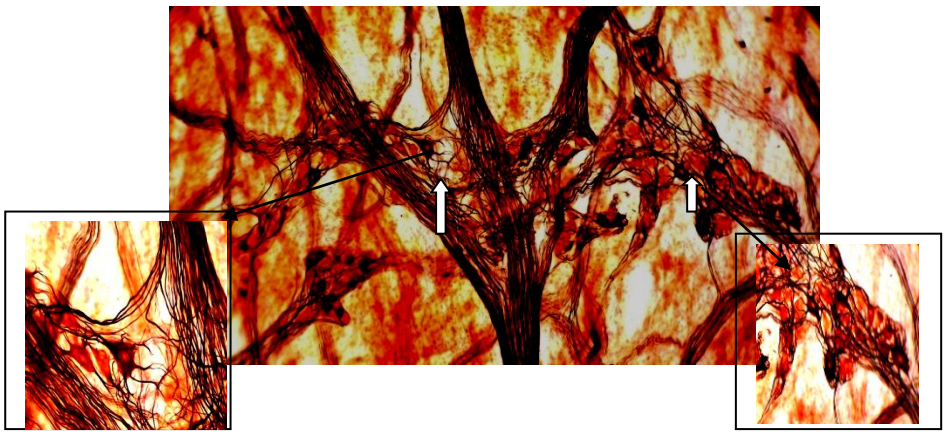

Fig.3. Large intramural nerve ganglion of the wall of the common bile duct of a dog. Light space around the bodies of Dogel type I nerve cells. In the lower corners are highlighted and enlarged drawings of Dogel type I cells. Impregnation according to Campos. Vol.20, approx.10.

Thus, Dogel type I nerve cells of the intramural nodes of the common bile duct have a number of morphological features that can be used to differentiate them from other types of node neurons. These data have a certain significance in identifying the typological, and therefore functional, affiliation of neurons of the autonomic nerve cells of the intramural nerve ganglia of the internal organs.

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