

## AGE-RELATED PATHOMORPHOLOGICAL CHANGES OF DYSREGENERATIVE PROCESSES IN NON-SPECIFIC ULCERATIVE COLITIS

Saydaliyev Sodikjon Soibjonovich

ASMI, Department of Pathological Anatomy and Forensic Medicine

**Abstract:** A morphological study of the enteric nervous system of the colon was carried out in C57Bl/6 mice with experimental dextran-induced acute ulcerative colitis. The cellular composition of the myenteric ganglia and cytometric parameters of myenteric neurons were studied. In colitis, compared with the control, a decrease in the number of hypochromic neurons and gliocytes, an increase in the number of hyperchromic neurons per ganglion, and a decrease in the size of neurons and their nuclei were revealed.

**Keywords:** Morphology, enteric nervous system, neurons, colitis, glia.

**INTRODUCTION:** According to clinical studies, in recent years there has been an increase in the prevalence of inflammatory bowel diseases, such as Crohn's disease and ulcerative colitis [1, 2]. In the pathogenesis of these diseases, along with the immune system, an important role is played by the enteric nervous system (ENS) - the own nervous system of the gastrointestinal tract, consisting of two nerve plexuses - submucosal and myenteric, which contain nerve ganglia, in their composition there are neurons and glial cells [3, 4].

**MATERIALS AND METHODS:** The work was performed on 10 sexually mature male mice C57Bl/6, body weight 20-28 g. The animals were kept in cages in natural light, temperature +20-22 °C, with free access to water and food. To induce acute colitis (n=5), drinking water in drinking bowls was replaced for 5 days with a 2.5% solution of dextran sulfate sodium (40 kDa, ApliChem). The control group of mice (n=5) received drinking water. For morphometry and photography, a Leica DM2500 microscope (x10, x40, x100 lenses) equipped with a Leica DFC 295 digital camera with a matrix with a resolution of 3.2 MP was used. ImageJ software and a Wacom graphics tablet were used. Cells in the myenteric ganglia were counted visually at 640 magnification under a microscope along the depth of the specimen.

**RESULTS AND DISCUSSION:** On days 3-5 from the start of consumption of sodium dextransulfate, the general condition of the animals in the experimental group, compared with the control, progressively worsened, motor activity and food consumption decreased, and piloerection was noted. On the 7th day of the experiment, all mice in the experimental group showed contamination of the anal area with feces mixed with blood. Upon autopsy of animals in the experimental group, a decrease in the length of the colon with alternating zones of expansion and narrowing of the lumen was noted. The contents of the colon in mice of the experimental group were liquid and dark red in color, while in the control group they were yellow-brown in color with an increase in the density of the contents in the distal colon.

In the myenteric ganglia of animals of the experimental group, compared with the control, focal discharge of the neuropil was determined. An analysis of the cellular composition of the myenteric ganglia revealed a statistically significant decrease in the number of hypochromic and an increase in hyperchromic neurons, and a decrease in the number of neuroglial cells. The total number of neurons per ganglion in acute ulcerative colitis compared with the control did not change statistically significantly (Table 1), and the area of the myenteric neurons of the central section and their nuclei decreased statistically significantly (Table 2).

Table 1.

Cellular composition of myenteric ganglia

Ganglion indicators	Control	Acute ulcerative colitis	Deviation from control, %	The reliability of the differences, p
Normochromic neurons	0,58±0,03	0,59±0,03	+2%	0,82
Hypochromic neurons	0,44±0,03	0,28±0,02	-36%	<0,05
Hyperchromic neurons	0,08±0,01	0,18±0,02	+55%	0,05
All neurons of the central section	1,1±0,05	1,05±0,04	-5%	0,37
Neurons with a nucleus that is not central in cross-section	0,32±0,03	0,34±0,03	+6%	0,49
Pyknotic neurons	0,08±0,02	0,08±0,01	0%	0,77
Normochromic neurons without a nucleus	1,22±0,05	1,09±0,05	-11%	0,2
Gliocytes	1,95±0,08	1,38±0,06	-30%	<0,05
Glio-neuronal index	1,77	1,31	-26%	

The indicators of the glioneronal index of the myenteric ganglia and the nuclear-cytoplasmic ratio of neurons in colitis did not differ between the groups (Table 1, Table 2).

Table 2

Area of the cytoplasm and nucleus of myenteric neurons in the central section

Indicators	Control	Acute ulcerative colitis	Deviation from control, %	Significance of differences, p
Neutron area in $\mu\text{m}^2$	103,11±3,34	90,32±2,26	-12%	<0,05
Core area in $\mu\text{m}^2$	46,88±1,06	43,56±0,85	-7%	<0,05
Nuclear-cytoplasmic index	0,48±0,01	0,50±0,08	+4%	

Contradictions in the results of studying the number of neurons and glial cells in the enteric ganglia in acute colitis may be due to the fact that highly specific immunohistochemical methods used to identify cell populations do not allow identifying cells with pronounced changes as a result of their loss immunoreactivity [3]. Thus, in areas of necrosis of the mucous membrane and submucosal layer in acute colitis induced by trinitrobenzenesulfonic acid, the disappearance of immunoreactive neurons and glial cells and their gradual appearance as the inflammatory process subsides is

described [4]. Therefore, assessment of pathological changes in the enteric nervous system using the traditional Nissl method is quite informative.

**CONCLUSION:**In dextran-induced acute ulcerative colitis in male C57Bl/6 mice, the total number of neurons per ganglion in the colon does not change compared to the control, but the number of hypochromic neurons and gliocytes decreases and the number of hyperchromic neurons per ganglion increases. The glio-neuronal index decreases, indicating a decrease in the trophic function of gliocytes.

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