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Cell-tissue reactions in an inflammation focus in carrageenan secondary-chronic inflammation on the background of substance P blockade

Cellular reactions in the inflammatory focus should be considered in the context of the relationship between different types of immune cells and tachykinins. Not-activated macrophages express the truncated form of NK1P, and after activation – both [1]. The truncated form of NK1P acts as an activator of dormant macrophages to enable the realization of tachykinin functions [1, 2]. It is likely that macrophages join the process of neurogenic inflammation only if it is severe. It was found that macrophages of the lung tissue of smokers expressed 3 times more NK1P than macrophages of the control group [3], and their number was significantly increased on macrophages of small arteries of the meninges [4]. The researchers concluded that tobacco smoke causes hyperexpression of NK1P by stimulating nicotinic acetylcholine receptors, which was minimized by a specific inhibitor [5]. From this we can conclude that other factors can interact directly with truncated NK1R, resulting in pathological expression of the long form of NK1R and pathological sensitization to substance P of macrophages and possibly other cells [1].

Thus, the unsolved problem today is to determine the Cell-tissue reactions in an inflammation focus in carrageenan secondary-chronic inflammation on the background of substance P blockade.

The **aim** of the study was to evaluate the cell-tissue reactions in an inflammation focus in carrageenan secondary-chronic inflammation on the background of substance P blockade.

Material and methods. The controlled randomized prospective experimental study was performed on 132 WAG rats. In the dynamics of experimental inflammation studied the reactions of the blood system (cellular and tissue changes in the inflammation focus and periphery) in the natural course of carrageenan secondary and chronic substance P. A carrageenan model of

inflammation was selected, using 10 mg of α -carrageenan (Sigma, USA) in 1 ml of saline [6], which was injected intramuscularly into the rat thigh under thiopental anesthesia. To inhibit the synthesis and effects of substance P NK-1R inhibitor aprepitant was used, which was administered intraperitoneally at a dose of 10 mg dissolved in 1 ml of isotonic sodium chloride solution, daily throughout the experiment [7]. To exclude the influence of natural circadian rhythms on the indicators, the experiment was performed in the autumn-winter period in a standardized way in the morning. Rats in the control series remained intact for inflammation during the experiment or were only administered the drug and kept under constant standard conditions. Experimental rats of intervention series in accordance with the tasks were subject to modeling of inflammation and the use of a pharmacological drug - an inhibitor of NK-1 receptors of aprepitant. Stratification of animals in separate series was carried out in the amount of 6 individuals. Non-parametric statistics was used with critical p 0.05.

Results and discussion. Morphological examination of muscle tissue samples shows that, as with the introduction of only carrageenan (series of natural inflammation), and carrageenan and substance blocker P, develop first alternative and exudative reactions, followed by a change in phases of inflammation from exudation to proliferation - the multiplication of cellular and tissue elements, and inflammation becomes proliferative with the formation of granulomas. The process of organization begins in the peripheral areas, gradually replacing the entire focus of inflammation.

Morphological changes in both study groups are identical, develop in approximately the same time with a small difference in the intensity of the process. But the blockade of substance P accelerates the processes of proliferation and organization. Thus, neutrophils in inflammatory cell infiltration in the series of blockade of substance P are visually reduced in number in the observation period of 2 days, while in the group of natural inflammatory infiltration still contains a significant number of neutrophils up to 7 days, however, in foci. inflammation begins to increase the number of cells of the

fibroblastic series and lymphomacrophage elements; the process of collagen formation in the series of blockade of substance P is observed in the observation period of 5 days, while in the group of natural inflammation - on the 7th day of observation; the appearance of granulomas in the series of blockade of substance P is observed on the 10th day of observation, and in the series of natural inflammation - only on the 21st day.

The study of the dynamics of changes in the cellular composition of the inflammatory focus revealed that the accumulation of neutrophilic, basophilic and eosinophilic leukocytes is detected in the observation period of 6 hours – 3 days with peaks of their content:

- neutrophils and basophils - for 2 days; at the same time, neutrophils - in the central parts of the inflammatory focus, basophils - in both zones (in the center and on the periphery) with a small predominance of the number of cells in the peripheral departments;

- eosinophils - for 1 day and with a slight decrease for 2 days, as well as with their predominant location in peripheral areas. This picture of the cell composition with the predominance of these cellular elements indicates the phase of exudation of the inflammatory process.

From 3–5 days, the cellular composition of the infiltrate is characterized by a predominance of lymphocytes, monocytes, macrophages, plasma cells, tissue basophils, fibroblastic cells (which appear in a single amount of blockade of substance P for 2 days), which indicates the development of the proliferation phase. The highest concentration of these elements is generally observed in the peripheral zones and prevails during the blockade of substance P, which, in turn, indicates the prevalence of proliferation and organization in peripheral areas.

Conclusion: the cell-tissue reactions in an inflammation focus in carrageenan secondary-chronic inflammation on the background of substance P blockade have been researched.

The prospects of further research is the development of criterional complex of blood system reactions system forecasting in the conditions of

inflammation and effects of substance P blocking.

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