

gical benefits arising from an average of 75% of cases, prolong the postoperative period, require a substantial voltage defenses, put off the dates of other components of comprehensive treatment, which adversely affects overall survival.

The levels of cytokines IL-2, IL-6, lactoferrin (LF), IL-8, AAB to AH lmdNA in blood and wound discharge has been determined in 52 patients before surgery, 1<sup>st</sup> and 7<sup>th</sup> postoperative day after radical mastectomy for investigation of the immunoinflammatory response. The study was performed using test systems produced by «Protein contour» Saint-Petersburg on the manufacturer's instructions. Results of enzyme linked immunosorbent assay were recorded on a vertical Multiskan photometer MSS 340 at a wavelength of 492 nm.

The study have been showed the significant increase in the concentrations of IL-2, IL-6, lactoferrin, and the trend toward increased levels of IL-8 and AAB to AH lmdNA in serum in the early postoperative days. The obtained data have been revealed the activation of destructive inflammatory process in women after radical mastectomy. The content in wound discharge IL-2 was significantly higher than its concentration in the blood serum in 4,25-fold, IL-6 in 4,7 times, IL-8 in 3,75 times and lactoferrin in 4,8 times. We concluded the greater severity of local manifestations destruktivno – immune – inflammatory process in women surveyed in the first day after surgery. Data correlation analysis have been revealed a relationship between IL-6 ( $r = 0,63; p < 0,05$ ); IL-8 ( $r = 0,45; p < 0,05$ ); AAB to AH lmdNA ( $r = 0,48; p < 0,05$ ) in blood serum and lymph. It demonstrates the relationship of destructive – immune – inflammation at the systemic and local levels.

The reduction of biologically active substances with pro-inflammatory properties (IL-6, IL-8, LF) on the seventh day after surgery have been proved a significant decrease in activity of the emergence of local and systemic inflammation. The indirect sign of the activity of destructive inflammatory process is significantly higher concentrations of markers of cell destruction AAB to AH lmdNA in the serum of patients in 7 day after surgery.

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## A STUDY OF CHROMATOLYSIS AFTER INJURY OF THE ACCESSORY NERVE IN RAT

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Injuries of many peripheral nerves are common during accidents and occasionally during surgical operations. As such, it is essential to investigate the changes that occur in the motor neuron somata of these nerves after such injuries. When the axon is cut (axotomy), the nerve cell body (soma) usually undergoes profound alterations in structure, metabolism, and physiological activity (*Grafstein, 1975*). Axotomy usually involves removal of a significant portion of the nerve cell volume, but most of the synthetic machinery of the cell, because it is localized in the soma, is left intact, and the defect produced in the surface membrane at the site of injury is small in relation to the total cell surface that remains (*Grafstein, 1975*). The Nissl granules are strikingly present in the large somata of motor neurons that supply skeletal muscle. For example, they are abundant in the motor neuron somata of ventral grey horn of the spinal cord. These granules are more obvious in large, highly active cells, such as spinal motor neurons (*Williams et al, 1989*). They are scattered throughout the neuronal soma and they extend into the dendrites (except in very thin dendrites) but are absent in the axon and axon hillock (*Junqueira et al, 1986*). The typical morphological changes in the cell body first recognized by *Nissl (1892)* include swelling of the cell and the apparent disappearance of basophilic material («Nissl substance») from the cytoplasm. The prominence of the latter phenomenon led to the general application of the term «chromatolysis» for the response to axotomy. However, it has become increasingly clear that the morphological manifestations of this response are different in different cells, and that chromatolysis itself is not invariably seen (*Romanes, 1941*). Hence the term «axon reaction», «retrograde reaction» or «cell body response» have come to be considered more appropriate to designate the whole range of alterations that may occur (*Grafstein, 1975*). The characteristics of these alterations have been considered in great detail by *Cragg (1970)* and *Lieberman (1971 and 1974)*. During chromatolysis, usually there is also a shift of the nucleus from its normal central location in the soma to the peripheral one, but away from the axon hillock. Chromatolysis sets in approximately one day after the injury of the axon and reaches its height within

about two weeks (*Greep, 1966*). In certain cases the cell may die but in majority of cases the process is reversible and the Nissl bodies reappear, the cell resumes its normal contour and the nucleus returns to its central position. However, it has become increasingly clear that the morphological manifestations of this response are different in different cells and that the chromatolysis itself is not invariably seen. As such, the terms, «axonal reaction», «retrograde reaction» or «cell body response» have been considered more appropriate to designate the whole range of alterations that may occur (*Grafstein, 1975*). The features of the response to axotomy that have been described above are seen to some degree in most neurons with axons that terminate outside the central nervous system. However, in some cases the reaction had been overlooked because it did not have the features of typical chromatolysis. *Romanes (1941)* produced injuries (crushing, cutting and violent rupture of the nerves) to median, ulnar, radial and musculocutaneous nerves in rabbit. He found that after a postoperative survival period of 7 to 21 days, none of the cells in the cervical region of spinal cord displayed the typical reaction which has been designated chromatolysis. He also found that some of the cells on the operated side showed an arrangement of Nissl substance which was not visible on the unoperated side, consisting of a grouping of the Nissl substance as a more homogenous ring around the centrally placed nucleus with a clearer zone of cytoplasm between this and the cell membrane; the Nissl substance was absent in the dendrites. However, *de Neef (1901)* found in the same animal (rabbit) that anything but violent rupture of the nerves, was ineffectual in producing chromatolysis. *Van Gehuchten (1900)*, *Bucy (1928)*, *Geist (1933)* and many others also did not find the classical reaction (chromatolysis) in the cell body of ventral grey horn neurons after peripheral nerve trauma. In spite of this chromatolysis is frequently used as an experimental method for determining localization in the spinal cord (*Romanes, 1946*).

Ten Sprague-Dawley rats (6 males, 4 females) were used in the study. Under general anaesthesia (30 mg per Kg Nembutal sodium, intraperitoneally) and aseptic conditions, the trunk of the right accessory nerve (before it supplies the sternocleidomastoid and trapezius muscles) was exposed in the neck and a portion removed to prevent re-union. After 21 to 28 days of post-operative survival, the animals were killed, their circulation flushed with normal saline and perfused with 10% formal-saline at a pressure of 120 mm Hg. After perfusion, the medulla oblongata and the 1st, 2nd, 3rd, 4th, 5th and 6th cervical segments of spinal

cord were removed by a dorsal approach, separated from each other, embedded in paraffin wax and their serial transverse sections cut at a thickness of 40 micrometers. The sections were mounted on slides and stained with thionine. On the operated (right) side, a varying number of neuron somata of the ventral grey horn showed certain retrograde changes (or cell body response). No retrograde changes were observed in the neuron somata on the left (control) side. The retrograde changes (cell body response) shown by these neuron somata were of the following two types:

a) Neuron somata with typical chromatolysis. These somata showed dispersion of Nissl bodies and loss of affinity for stain (thionine). The cell often appeared more round than usual apparently because of some swelling. They had peripheral (eccentric) nucleus. Their nucleoli were either central or eccentric. From 15,42 per cent to 30,21 per cent of somata with cell body response were found to show typical chromatolysis.

b) Neuron somata with retrograde changes (cell body response) but without a typical chromatolysis. In these somata, there was a grouping of the Nissl substance as a more homogenous ring around the centrally placed nucleus with a clearer zone of cytoplasm between this and the cell membrane. Nissl substance was absent in their dendrites. From 69,79 per cent to 84,58 per cent of somata with cell body response were found to be of this type.

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**LOCALIZATION OF THE MOTOR NEURON SOMATA OF THE SPINAL PART OF ACCESSORY NERVE IN THE MEDULLA OBLONGATA OF A RAT – A NISSL STAINING STUDY**

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The motor neuron somata of the spinal part of accessory nerve form a group of neuron somata called the spinal nucleus of accessory nerve (SNA,