# ON THE WAY TO PERSONALISED CORRECTION OF THE OXIDIZING HOMEOSTASIS DISTURBANCES WITH ACUTE PANCREATITIS

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The results of the induced chemoluminescence blood serum study of patients with different forms of acute pancreatitis have been presented. The presence of reliable differences in the condition of peroxide homeostasis within patients with edematous pancreatitis, sterile and infected pancreatolysis, that can be linked with intensive consumption of active for,s of hydrogen have been shown. Original conception of pathogenic rational ozon-therapy that implies individual selection of oxidant doze and its dynamic correction under the control of free-radical oxidation intensity and antioxidant activity of blood serum has been suggested.

## Introduction

It is known, that hypoxia and linked with it redundant activation of peroxide oxidation of lipids on a background of insufficient antioxidant system play key role in the mechanisms of the development of pathological process with acute pancreatitis [1, 3, 5]. Methods of the correction of insufficient antioxidant system function that are based on introduction of oxidants or inductors of active hydrogen forms into the organism are being improved actively introduced into clinic practice. The success and safety of medical treatment in this case are defined by the adequacy of the introduced oxidant dosage. The range of recommended therapy doses of preparations and methods of the introduction is oriented for average statistic biochemical measures and does not allow us to take nosological form of acute pancreatitis, age, patient body mass, individual indexes of lipid peroxidation intensity at the moment of treatment, that can vary in a wide range, into consideration [2, 6, 7, 8]. All mentioned above has been a foundation for searching new possibilities of pathogenic therapy of acute pancreatitis. The goal of the study is to improve the results of patients with acute pancreatitis treatment by implementation of new method of rational oxide correction.

## Method and materials

160 patients with different forms of acute pancreatitis aged 22-76 years were under our supervision in clinic. Retrospective analysis included 54 patients with acute pancreatitis that had been treated in the clinic of general surgery of Krasnoyarsk State Medical academy in the period of 2002-2004 and that made up the first group. Prospective study has been carried out and in the period of 2005-2009 and it included 106 patients. The method of ozon-therapy has been used within complex treatment. In a meanwhile the traditional method of ozon-therapy was implemented within 50 patients that formed the second group and the original method of rational ozon-therapy was used among 56 patients of the third group.

Among patients there were 96 men (60%), and 64 women (40%). In 61,3% of observations acute pancreatitis had an alcohol genesis, in 19,4% the cause was the diseases of gall tracts, within 11,9% of patients the development of acute pancreatitis was conditional from alimentary factor. Among the other causes trauma of grand has been noticed within 1,3% of cases, and the cause has not been found within 6,3% of patients. An edematous pancreatitis was found among 77 (48,1%) patients, sterile pancreatolysis – among 43 (26,9%), among 40 (25%) an in-

fected pancreatolysis has been found. The method of gull-induced luminal-dependant chemoluminecsense serum with usage of biochemiluminometer BCHL-06M has been used for estimation of peroxide homeostasis condition. The objects of the chemoluminecsense research were erythrocytes and blood serum.

Complex infusive therapy aimed for suppression of the pancreas gull exocrine function and decrease in level of pancreatogene toxemia have been carried out in the department. The method of intravenous ozon-therapy has been additionally implemented for the patients of the second and the third group. Ozonized physiological solution of sodium chloride with ozon concentration of 2-8 mg/l was prepared by the barbotage of isotonic solution of sodium chloride by ozon-hydrogen gas mix with the installation UOTA-60-01-"Medozon". Standard scheme of ozon therapy was used among the patients of the second group: intravenous drip introduction of ozonized physiological solution with concentration of 2-8 mg/l I the amount of 200 mg every other day within 7-10 days. Within the treatment of the third group patients an original method of rational ozon therapy was implemented with individual section of ozon dose.

Methods of descriptive and variation statics have been used for statistic processing of the results. The main characteristics of descriptive statistic were arithmetic average (M) and standard (σ) deviation. The check of the analysed parameters correspondence to normal distribution was carried out with the criterion of the accordance ($\chi 2$). In case of distribution that differs from normal the Wilkinson criterion was implemented for linked selections and Mann-Witney – for unlinked selections. Statistic package Microsoft Excel for operational system Windows XP and program Statistica 6.0 (StatSoft, Inc.) were used for calculations.

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**Results and discussion**

Maximum value of intensity of chemoluminescence (I max) was registered within the patients with sterile pancreatolysis at the moment of their arrival. The level of I max exceeded the age norm values within the first week of stationary treatment and reliably decreased only after 20 days with traditional therapy.

Among the patients with diagnosed infected pancreatolysis very low value of the intensity of chemoluminescence, was present within the first week of stationary treatment. It did not exceed 30 mV independent on gender and age of patient. The criterion of the solution of infection process among the patients with pancreatolysis was the increase in the content of hydroperoxides in blood serum (3,8 times according to index I max) and the increase of sum anti-oxidant activity according to chemoluminescence analysis.

According to modern notions, the process of free-radical oxidation has physiological character and always accompanies the process of healthy cell vital functions. That is why deep disturbances of oxidation homeostasis that are registered among patients infected by pancreatolysis on early terms of the disease signal us of massive volume of necrosis, forming of superantigen, and the conjunction of bacterial infection that require high consumption of active oxygen forms.

Method of intravenous ozon therapy was implemented among the patients of the second and the third group. The algorithm of rational ozon therapy that was used within the patients of the third group, implied the estimation of different concentrations of ozon for the intensity of free-radical oxidation in model systems and the selection of ozon dose, with the addition of which the parameters of chemoluminescence that were the closest to the age norm were registered. Ozonised physiological solution, that contained ozon of the selected dose, was introduced intravenously in drips in the amount of

200 ml every other day for 7-10 days. The implementation of ozon therapy among the patients with acute pancreatitis was controlled by the method of induced chemoluminescence. The absence of positive dynamics of the parameters of active chemoluminescence after two sessions of ozon therapy required recurring correction of ozon dose.

Under the impact of intravenous ozon therapy with empiric selection of ozon dose short-term activation of free-radical oxidation took place. That was displayed by statistically substantial exceeding of malonic dialdehyde in comparison with the norm after three days of treatment. Individual selection of ozon dose allowed us to minimize its prooxide impact that was conductive to early activation of antioxidant system. The most significant differences in the results of ozon therapy implementation among the patients with pancreatitis were registered by luminol-dependent gull-inducted chemoluminescence of blood serum.

At the moment of the arrival to hospital the maximum amplitude of activated glow and coefficient K, that reflects antioxidant potential of the serum, did not have reliable differences among the groups. After the first session of ozon therapy an increase in the chemoluminescence intensity started within the patients of the second group. This displays internal activation of free-radical oxidation. At the same time a reinforcement of serum activity was pointed out. It provides for the stabilization of peroxide processes and the end of stationary treatment.

Carrying out the algorithm of the selection of individual therapeutic dose of ozon for patients with edematous pancreatitis allowed us to define an adequate amount of the oxidant, that is necessary for breaking the cascade of free-radical oxidation without its internal induction. According to literature data the mechanism of such influence is the ability of ozon to participate in the reaction of radical annihilation that leads to the breaking of chains and the creation of molecular oxygen [4]. By the moment of third group patients discharge from hospital, the antioxidant activity of blood serum exceeded control values almost two times , thus compensating preserved hyperproduction of active oxygen forms.

A decrease in concentration of malonic dialdehyde was observed after seven days of stationary treatment among the patients with destructive pancreatitis, and within the third group the values of this indicator were reliably lower than internal ones and those registered in the comparison groups. After the end of ozon therapy session a gradual increase in malonic dialdehyde concentration was registered among the patients with destructive pancreatitis of the second group, its peak was registered on the 14th day. Pending all period of the research steadfast decrease of lipid peroxidadion products concentration was observed among the third group patients independently on the ending of ozon therapy sessions. According to the results of chemoluminescence serum analysis the implementation of individual ozon doses provided for early activation of antioxidant system and normalization of peroxide oxidation processes. Besides in difference with the first group the alterations mentioned above had a prolonged character and stayed preserved after the end of ozon therapy session.

The introduction of rational ozon therapy algorithm into the complex of acute destructive pancreatitis treatment allowed us to decrease after-operational lethality from 32,1% to 20,7%. The lethality structure did not have reliable differences among the groups. The most common causes of death among patients in early terms were poliorgan deficiency (31,8%), and abdominal sepsis in late terms (22,7%).

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