

Effect of Intravenous Laser Irradiation of the Blood on Plasma Content of Ceruloplasmin in Patients with Chronic Pancreatitis

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Ceruloplasmin content in the blood plasma significantly increased in patients with chronic pancreatitis during exacerbation of the disease. Addition of intravenous laser irradiation of the blood to complex therapy of patients with chronic pancreatitis normalized ceruloplasmin content in the plasma.

Key Words: *chronic pancreatitis; ceruloplasmin; intravenous laser irradiation of the blood*

Chronic pancreatitis is one of the most urgent problems of gastroenterology. This disease constitutes up to 10% in total morbidity structure [4,8]. Disturbances in the oxidant-antioxidant system are undoubtedly an important component in the pathogenesis of chronic pancreatitis [1]. Ceruloplasmin (CP) is considered to be the major plasma antioxidant [7].

CP, a copper-containing oxidase of the human blood, is intensively studied in many aspects: its molecular and biological properties; mechanism of action, physiological role, and possible applications in clinical practice [3,7].

Low-intensity laser irradiation is now widely used in various branches of medicine due to new experimental and clinical proofs of high therapeutic efficiency and the absence of complications and side effects [2,5,6,9].

Here we studied the effect of intravenous laser irradiation of the blood (ILIB) on plasma content of CP in patients with chronic pancreatitis.

MATERIALS AND METHODS

We examined 90 patients with chronic pancreatitis (69 women and 16 men) aging 36-77 years (mean 53.1 ± 5.2 years); history of chronic pancreatitis varied

from 1-28 years (mean 7.8 ± 2.3 years). The control group comprised 45 patients receiving drug therapy including analgesics, spasmolytics, protease inhibitors, antisecretory drugs, infusion therapy, and enzymes. Patients of the main group ($n=45$) apart from the same drug therapy additionally received ILIB performed using a Matriks VLOK apparatus for laser therapy ($\lambda=630$ nm, radiation power at the tip of the lightguide 1.5-2.0 mW); duration of the procedure was 20 min. The course consisted of 7 daily irradiation sessions. Additionally, 30 healthy individuals were examined.

The diagnosis was made on the basis of clinical examination and laboratory and instrumental tests.

The state of the antioxidant system was evaluated by activity of extracellular antioxidant enzyme CP in blood plasma using a modified Ravvin method. The method is based on enzymatic oxidation of *n*-phenylene diamine by CP. Optical density of the experimental sample against control (weak rose-lilac staining) was measured on a PV 1251 C spectrophotometer (Solar) at $\lambda=530$ nm.

Significance of difference was evaluated by Student *t* test; the differences were significant at $p < 0.05$.

RESULTS

The concentration of CP in blood plasma of patients with chronic pancreatitis was elevated compared to that in healthy individuals (Table 1).

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TABLE 1. Plasma CP Content ($\mu\text{mol/liter}$) in Patients with Chronic Pancreatitis in the Dynamics of Therapy ($M\pm m$)

Group	Before treatment	After treatment
Healthy	1.3 \pm 0.2	
Control	1.91 \pm 0.22*	1.63 \pm 0.30
Main	1.97 \pm 0.21*	1.40 \pm 0.20 ⁺

Note. * $p < 0.05$ compared to: *healthy individuals, ⁺control group.

CP is a vitally important multifunctional protein. Due to some its properties it was classified as an acute phase protein. It was found that blood level of CP increases in acute and chronic inflammatory processes. During inflammation, CP inactivates free radicals formed by phagocytizing leukocytes and released into the extracellular fluid lacking defense enzymes catalase and SOD [7].

Since CP is an acute-phase reactant, the increase in its level in patients with exacerbation of chronic pancreatitis observed by us probably reflects activity of the inflammatory process in the pancreas and imbalance of LPO processes.

After drug therapy, a tendency to normalization of CP level was observed (Table 1).

After addition of ILIB to complex therapy of exacerbation of chronic pancreatitis, the initially elevated

concentration of CP in blood plasma significantly decreased and returned to normal.

The significant decrease and normalization of CP content in the main group probably reflect more rapid suppression of the inflammatory process in the pancreas against the background of complex therapy with ILIB, because it is known that low-intensity laser irradiation exhibit pronounced anti-inflammatory and antioxidant effects.

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