Hyperlipidemia

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[Laser correction of microcirculation disorders in patients having CHD with hypercholesterinemia]

[Article in Russian]

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The study demonstrates that hypercholesterinemia in patients with coronary heart disease (CHD) is associated with functional depression of microcirculation, increase in total peripheral vascular resistance, reduction in the functional efficiency of heart and decrease in activity tolerance. After receiving a course of low-intensity infrared laser radiation treatment the patients displayed positive changes in blood lipid spectrum, which was associated with improvement in microcirculation, decrease in afterload, increase in economization of heart functioning and activity tolerance. The obtained results demonstrate that the hypolipidemic effect of laser radiation is a substantial factor in the regression of CHD manifestations.

DYNAMICS OF HYPERLIPIDEMIA AND PERIPHERAL BLOOD FLOW IN PATIENTS WITH DIABETES MELLITUS AFTER THE COURSE OF COMBINED LASER THERAPY IN AMBULATORY-POLYCLINIC CONDITIONS

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The problem of metabolic-vascular disturbances in patients with diabetes mellitus still is one of the most important in clinic of inner diseases. In the course ofLT 218 patients, between 19-67 years of age, with diabetes mellitus (the period of observation is 7 years) have been investigated. Among them 93 had the 1st type of DM, 125 - the lind type. The absolute majority of the patients had a compensation or subcompensation of diabetes. To estimate peripheral blood flow we used doppler-and/or rheovasography. 57 patients underwent a conjuctival biomicroscopy, In all patients we examined total blood cholesterol (TC), in a part of the patients • triglycerides, LDL and HDL cholesterol level. We also controlled glycemia and peripheral blood flow.

For the treatment we used intravenous laser blood irradiation (ILBI) by continuous He-Ne irradiation (wavelength - 0,63 mm, power at the light-guide end - 2 mW).

Simultaneously we performed percutaneous procedure by low-energy laser irradiation (apparatus 'MUSTANG') with the wavelength - 0,89 mm, power - from 5 to 20 mW on shin muscles (dose 4,5 J, frequency 80 Hz), liver, pancreas, spleen projections (frequency 150 Hz), 4 min on each zone, 8-10 procedures, daily. Repeated courses were given in 3 and 6 months. Sugarcorrecting medications were decreased 2 times in combination with antioxidant AEVIT. From the first days of treatment the patients' extremeties grew warmer, decreased the pain syndrome, disappeared the symptoms of encephalopathy. Together with the subjective rehabilitation of the patients, figures of TC, LDL cholesterol and triglycerides decreased to their norm or its upper limits with simultaneous increase of alpha-LP. Sugar concentration in blood also decreased.

It is known that diabetic angiopathy is a result of generalised pathological metabolic disorder, lipid metabolism disorder in particular, when the rates of LDL cholesterol and VLDL cholesterol in blood increase and damage the endothelium.

Thus, the application of combined laser therapy in complex treatment of patients with diabetes mellitus we regard as an important and necessary component of angiopathies prevention or their regress in cases of DM of any type and as a basis for prolonged compensation of DM.

Ambulatory Application of Combined Laser Therapy in Patients with Diabetes Mellitus and Dyslipidemia

Laser Partner, 17.5.2002

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Abstract

This study sought to evaluate the dynamics of lipid metabolism in blood plasma and clinical efficiency of combined laser therapy (CLT) in patients with diabetes mellitus.

Introduction

Atherosclerosis in patients with diabetes mellitus (DM) is characterized by early development and spreading, that enables to speak about DM as a natural model of atherosclerosis [5]. DM and atherosclerosis are diseases with similar lipid disorders accompanied by hypercholesterolemia, hypertriglyceridemia and hypo-alpha-cholesterolemia [5]. It is established that under insulin-dependent DM (IDDM) hyperlipoproteinemia is secondary. It results from absolute insulin insufficiency and reduction of lipoprotein lipase activity. Hyperlipoproteinemia may be reversible provided that it is effectively treated. Besides, any dyslipoproteinemia under DM is not only a strong risk factor for the development of atherosclerosis, but also is one of the leading factors in a specific microangiopathy pathogenesis [1,2]. “Usual” for DM patients hypoxia is considerably intensified under dys- and hyperlipoproteinemia, simultaneously increasing insulin defficiency and decreasing receptor sensitivity of cells. It hampers the treatment of patients and promotes the progression of diabetic microangiopathies.

Patients with NIDDM are not protected from CHD caused by qualitative and quantitative changes of blood lipoproteins (LP) [3]. Out of quantitative LP changes characteristic of NIDDM are hypertriglyceridemia and high-density lipoprotein cholesterol reduction [6,15,16,20,25,27] on early stages of the disease [9], which are registered in 20% patients [17,22,26]. According to some investigations [4,7,14] the most common lipid disorder under NIDDM is combined hyperlipidemia, revealed in the high levels of triglycerides (TG), total cholesterol (TC), low-density lipoprotein cholesterol (LDL-c) and the reduced level of high-density lipoprotein cholesterol (HDL-c). The most usual lipid disorder under NIDDM is hypertriglyceridemia, in most cases type IV, generally stipulated by the intensified very low-density lipoproteins cholesterol (VLDL-c) synthesis [5]. The HDL-c reduction is revealed both under newly established NIDDM and in patients with a prolonged diabetic record corrected by hypoglycemic preparations and insulin. Some investigations established a connection between insulin resistance and the low level of HDL-c [18]. The HDL-c concentration increases under insulin therapy [21] and weight reduction [3,13]. According to M. Laakso et al. (1988), the HDL-c reduction is of great importance for CHD morbidity and mortality prognosis in patients with NIDDM. The HDL-c reduction down to 0,9 mmol/l and less was accompanied by the fourfold risk of CHD death.

A number of investigations [10,17,22] showed that hypercholesterolemia, stipulated by the increased level of LDL-c, is revealed in 54-77% of patients. Correction of glycemia is accompanied by the reduction of TC and LDL-c level [27]. Multiple Risk Factor Intervention Trial (MRFIT) [24] established the interconnection between TC and heart mortality of patients with DM. The obtained results showed that the higher cholesterol level in diabetic patients caused the higher risk of heart death. However, the same cholesterol level caused the higher (3-4 times) CHD mortality in patients with DM as compared to patients without it.

The analysis of not numerous literature showed that there are still no any optimum approaches to lipid disorders treatment under DM. Moreover, dyslipidemia in diabetic patients are not practically corrected at present, that is mainly stipulated by high prices for known drugs.

Objective: This study sought to evaluate the dynamics of lipid metabolism in blood plasma and clinical efficiency of combined laser therapy (CLT) in patients with IDDM and NIDDM.

Materials and Methods

Within the last 2 years in conditions of out-patient department we observed 205 patients with NIDDM and 54 – with IDDM.

The lipidnormalizing effect of CLT in combination with antioxidant therapy (aevit 600 mg a day) we have studied in 60 individuals with NIDDM (8 men and 52 women), mean age - 57,3± 3,2 years, with the level of fasting glycemia no more than 9,0 mmol/l, HbA_{1c} – 7,3± 0,19 and 7,27± 0,23%. The other 29 patients (with NIDDM) constituted the control group and have been treated only by sugar-reducing medications.

In all patients we conducted lipid profile investigation. We also controlled glycemia, enzymatic blood activity (ALT, AST), clinical manifestations of angiopathy and performed the conjunctival biomicroscopy. All examinations have been done prior to treatment, in 2 weeks (i.e. immediately after the treatment), in 8 days, 1, 4 and 9 months after the treatment.

Hypolipidemic action of CLT has been evaluated by the dynamics of TC, TG, LDL-C, HDL-C and atherogenity rate (AR). Lipid profile has been investigated in venous blood serum taken in the morning hours after 12-14 hours fasting. For trials we used biochemical analyser. TC - by Enzyme methods (CHOD-PAP), TG - UV enzyme method, HDL-c – after VLDL-c and LDL-c sedimentation by heparin in magnesium ions presence. VLDL-c and LDL-c we determined by W. Friedwald: VLDL-c = TG/5, LDL-c = TC - (HDL-c – VLDL-c). AR has been calculated by A.N. Klimov: AR = TC – HDL-c/HDL-c.

The conjunctival biomicroscopy has been conducted with the help of photoobservation slot lamp. Different parameters of microcirculation (vascular convolution, blood flow speed, arteriovenular interrelations, red blood cell aggregation, etc.) have been assessed.

We performed a staged course treatment within 9 months. Repeated courses were given in 3 and 6 months. Each course consisted of 8-10 sessions of intravenous laser blood irradiation (ILBI) by red spectrum laser, l =0,63 mm, capacity at the light-guide end - 2 mW, exposure - 15-30 min. Simultaneously we conducted a percutaneous procedure by low intensive laser irradiation (LILI) in the near infrared spectrum, l =0,89 mm, capacity at the light-guide end - 5 - 20 mW in combination with magnetic nozzles on gastrocnemius muscle, liver, pancreas, spleen projections - frequency 150 Hz, exposure 4 min. on each zone.

Results

29 patients of the control group showed no obvious deviations of blood plasma lipids after 10-days intake of aevit (table 1). This conformity has been also registered under the subsequent courses of antioxidant therapy by aevit in 3 and 6 months.

In the main group of patients (table 2) TC level prior to treatment averaged to 8,2± 0,31 mmol/l, TG - 2,14± 0,08 mmol/l, LDL-c - 7,87± 0,30 mmol/l, HDL-c - 0,99± 0,04 mmol/l. AR made up 7,28± 0,28, LDL/HDL-c ratio - 7,94± 0,30 (with current standard being < 5,0).

Immediately after the conducted therapy no significant deviations of lipid profile have been seen. The level of TC slightly decreased to 7,98± 0,31 ($p<0,01$). The level of TG even slightly increased until 2,51± 0,09 ($p<0,01$). In a part of patients the normalization of the examined parameters was accompanied by a temporary elevation of LDL-c from 7,87± 0,30 tî 7,9± 0,30 ($p<0,05$), that was probably connected with the intensified biosynthesis of lipids, resulting from the improved metabolism in liver. At the same time HDL-c concentration increased from 0,99± 0,04 tî 1,14± 0,04 ($p<0,05$). AR decreased

from 7,28± 0,28 tî 6,00± 0,23 (p<0,05), respectively. LDL/HDL-c ratio made up 6,92± 0,27 (p<0,05).

Hypolipidemic action of CLT has been distinctively revealed in 1 month after the performed treatment with the efficient reduction of TC level from 7,98± 0,31 tî 5,31± 0,20 (_< 0,01). The tendency to the reduction of TG from 2,51± 0,09 tî 1,69± 0,06 (p<0,01) and elevation of HDL-c from 1,14± 0,04 tî 1,42± 0,05 (p<0,01) has been registered. The level of LDL-c decreased from 7,90± 0,30 tî 6,63± 0,25 (_<0,05). AR lowered from 6,00± 0,23 tî 2,73± 0,10 (_<0,01). The LDL/HDL-c ratio decreased from 6,92± 0,27 tî 4,66± 0,18 (p<0,01).

In 9 months the level of TC made up 6,01± 0,23 (p<0,01), TG – 1,62± 0,06 (p<0,01), LDL-c – 5,82± 0,22 (p<0,01), HDL-c – 1,39± 0,05 (p<0,01), AR – 3,30± 0,13 (p<0,001), LDL/HDL-c – 4,18± 0,16 (p<0,01).

Within the whole staged treatment blood plasma lipids in patients of the control group remained practically unchanged.

We also established positive deviations in clinical picture. It manifested in dynamics of general clinical diabetic symptoms, diabetic macropathy of lower limbs under the following scale: pain - sensitiveness to cold - walking, conjunctival biomicroscopy changes. The state of patients, suffering from IDDM and NIDDM complicated by diabetic angiopathy of pelvic limbs, improved in the main group after 2-3 sessions of CLT. Patients showed decrease or disappearance of pain, cramps and paresthesia, “getting warmer” of limbs. No dynamics of clinical picture in the control group have been revealed. By the end of treatment, symptoms of diabetic encephalopathy and asthenia disappeared in all patients. Mood and sleep also improved.

By the end of treatment fasting glycemia in NIDDM patients decreased from 14,21± 0,85 to 11,27± 0,67. In 3 weeks the level of glycemia in this group of patients decreased at most until 6,01± 0,35. Fasting glycemia in IDDM patients even increased from 10,46± 1,46 to 11,82± 1,65. And only after the third week it reduced to 7,45± 1,04. Thus, the distinctive positive effect in respect of carbohydrate metabolism has been reached. Consequently, dosages of insulin and sugarcorrecting medications have been considerably lowered.

The results of ophthalmologic investigation demonstrated the improved retinal blood circulation in the greater part of patients of the main group with diabetic retinopathy. It has been expressed in the normalization of arteriola/venule ratio, reduction of plasmarrhage, resorption of micromacular hemorrhages and retinal edema, improvement of retinal trophism. Under the influence of CLT the blood flow speed in retinal vessels increased by 35-38%, red blood cell aggregation lowered 1,3-1,4 times. Patients of the control group did not show any improvement of retinal blood circulation.

Thus, our experience of the ambulatory application of laser therapy demonstrated the distinct effect in respect of lipid profile normalization. No side effects and complications have been registered.

Conclusions

It is safe to say that:

1. Combined laser therapy enables to avoid the intake of hypolipidemic and lipotropic agents, as in the result of treatment we observed the prolonged effect in respect of the most important, pathogenetically significant deviations of lipid metabolism: a true increase of HDL-c in the nearest catamnesis (which preserves up to 6-10 months) and decrease of LDL-c. Simultaneously we registered a true lowering of TC, TG to the norm or its upper limits. AR reduced more than 3 times and the LDL/HDL-c ratio - twice.

2. The application of a staged CLT in treatment of patients with IDDM and NIDDM enables to obtain a distinct, long-term, positive effect in respect of carbohydrate metabolism, simultaneously reducing insulin and sugarcorrecting medications dosage. It also results in microcirculation improvement.

Tables

Table 1: Dynamics of lipid profile (mmol/l) in patients with diabetes mellitus ($M \pm m$)

Observation periods	Group of patients	TG (0,40 – 1,53)	TC (3,9-5,2)	LDL (3,0-4,5)	HDL (1,5-3,3)	AR (2,5-3,5)	Ratio LDL/HDL (do 5,0)
Initially	I	2,11 ± 0,12	7,92 ± 0,44	7,80 ± 0,43	0,91 ± 0,05	7,70 ±0,43	8,57 ± 0,48
After therapy	II (1) II (2)	2,14 ± 0,10 2,51 ± 0,11	8,20 ± 0,38 7,98 ± 0,37	7,87 ± 0,37 7,90 ± 0,37	0,99 ± 0,04 1,14 ± 0,05	7,28 ± 0,27 6,00 ± 0,23	7,94 ± 0,30 6,92 ± 0,26
In 3 weeks	II (3) I	1,69 ± 0,07 2,10 ± 0,12	5,31 ± 0,25 7,91 ± 0,44	6,63 ± 0,31 7,79 ± 0,44	1,42 ± 0,06 0,92 ± 0,05	2,73 ± 0,10 7,59 ± 0,42	4,66 ± 0,18 8,46 ± 0,47
Changes, times	p (1 - 2) p (2 - 3) p (1 – 3)	1,3 > 0,05 > 0,05	1,54 > 0,05 < 0,05	1,2 > 0,05 > 0,05	1,4 > 0,05 > 0,05	3,3 > 0,05 < 0,05	2,0 > 0,05 < 0,05
		> 0,05	> 0,05	> 0,05	> 0,05	> 0,05	< 0,05

In 3 months: Before therapy In 3 weeks	II II I	1,72 ± 0,08 1,51 ± 0,07 2,12 ± 0,12	5,42 ± 0,25 5,27 ± 0,24 7,94 ± 0,44	6,21 ± 0,29 5,42 ± 0,25 7,84 ± 0,44	1,61 ± 0,07 1,67 ± 0,07 0,90 ± 0,05	2,37 ± 0,09 2,15 ± 0,10 7,82 ± 0,44	3,85 ± 0,18 3,24 ± 0,15 8,71 ± 0,49
In 6 months: Before therapy In 3 weeks	II II I	1,62 ± 0,07 1,54 ± 0,07 2,12 ± 0,12	6,01 ± 0,28 5,28 ± 0,24 7, 89 ± 0,44	5,82 ± 0,27 5,70 ± 0,26 7,80 ± 0,44	1,39 ± 0,06 1,42 ± 0,06 0,91 ± 0,05	3,30 ± 0,15 2,70 ± 0,12 7,67 ± 0,43	4,18 ± 0,19 4,00 ± 0,18 8,57 ± 0,48

I – Control group (n=22) – patients with DM without application of LLLT
II – Main group (n=37) – patients with DM with application of LLLT

Table 2: Rates of glycemia *(M ± m)*

Observation periods	Group of patients	Glucose, mmol/l	
		NIDDM	IDDM
Initially	I	14,43 ± 0,86	9,97 ± 1,02
After therapy	II (1) II (2)	14,21 ± 0,85 11,27 ± 0,67	10,46 ± 1,46 11,82 ± 1,65
In 3 weeks	II (3) I	6,01 ± 0,35 14,32 ± 0,86	7,45 ± 1,04 10,12 ± 1,04
	p (1 - 2) p (2 - 3) p (1 - 3)	> 0,05 < 0,05 < 0,05	> 0,05 < 0,05 < 0,05
In 3 months: Before therapy In 3 weeks	II II I	7,98 ± 0,47 6,03 ± 0,36 14,41 ± 0,86	6,38 ± 0,89 5,72 ± 0,79 10,24 ± 1,05

In 6 months:	II	6,81 ± 0,40	5,89 ± 0,82
Before therapy	II	6,02 ± 0,36	5,54 ± 0,77
In 3 weeks	I	14,37 ± 0,86	10,31 ± 1,06

I - Control group (n=22) – patients with DM without application of LLLT - (IDDM – 10 patients, NIDDM – 20 patients);
II – Main group (n=37) – patients with DM with application of LLLT - (IDDM – 10 patients, NIDDM – 27 patients).

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DYNAMICS OF LIPID METABOLISM AND PERIPHERAL BLOOD FLOW RATES IN PATIENTS WITH ATHEROSCLEROSIS IN CONJUNCTION WITH RENAL DYSFUNCTION AFTER THE COURSE OF COMBINED LASER THERAPY

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Correction of hyperlipidemia is an important step in prevention of atherosclerosis. Within the last years Low-Level Laser Irradiation (LLLI) has been widely used in the treatment of patients with atherosclerosis. It is an effective medical remedy which has a distinct therapeutic influence on a wide range ofdegenerate-dystrophic and inflammatory diseases.

Within the 8 years a number of patients with atherosclerosis appealed to our Center for treatment. In all of them we observed an expressed hyperlipidemia, rheologic blood properties disorder, hypercoagulative deviation in coagulative system ofhomeostasis (changes ofthrombocytic-vascular hemostasis). After the course of combined laser therapy (CLT), practically in all patients we observed a distinct antiatherogenic effect.

Taking into account that hypolipidemic effect of intravenous laser blood irradiation (ILBI) is insufficiently studied, the necessity in more detailed researches is ripe.

This study sought to evaluate the dynamics of blood plasma lipid spectrum rates and clinic effect in patients with atherosclerosis combined with various renal pathology after the course of CLT - low-level laser irradiation in the red and near infrared spectrum. Besides, in this investigation we aim to prove the advantages of CLT application in patients of this group as a highly efficient, ecologically clear and perfect medical remedy with a distinct hypolipidemic, lipotroimages action as compared with the known expensive phannacologic agents with a lot of side-effects.

Analysis of the examinations has showed the true increase of HDL level in the nearest catamnesis (which preserves up to 6 months) after the conducted CLT. The less active dynamics was registered for the phenomenon ofLDL level decrease, hi average, there has been a more "postponed" reaction - 2-3 months.

Our study has demonstrated the decreased level of total cholesterol, LDL cholesterol and triglyeerides to the norm or its upper limits with simultaneous increase of HDL cholesterol level in patients with atherosclerosis.

Taking into consideration that CLT has a multifactorial adaptive influence on an organism, the applied method gives the unique possibility (for the patients with combined atherosclerosis and renal pathology, in particular) to extend the remission period of the basic disease 2,5 times, in average, without the application of phannacologic agents, or to considerably dicrease it avoiding polypragmasy. The obtained results of the stable hypolipidemic action of CLT allow to prevent the atherogenesis in patients with metabolic disorders (particularly renal pathology) or to achieve the atherosclerosis regression,

LASER TREATMENT FOR HYPERLIPIDEMIA

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Not a sing method of hyperlipidemia treatment among the generally accepted ones (such as diet, regular moderate physical exercies in open air, radical therapy) can be cousidered effectiv enough. Consequently, the problem of looking for new effective methods of treatment remains urgent.

The approach to treatment depends on the type of hyperlipidemia and its seriousness. There is a cause and effect connection between lipid metabolism disorders and such widely spread diseases as ischemic heart disease, arteriosclerosis, diabetes, hypertonia and others. Most authors point out a correlation between the level of triglycerids and trombogenesis, hemodinamic disorders and a lipiid level rise in plasma.

Taking into account the vascular dilating, antiagregating, analgetic effects of low intensive helium-neon laser radiation (LLR) and also its property to improve metabolism and microcffculation, we applied tht in-vein laser blocd uradiation method (ILBI) together with traditional therapy methods to patients, who suffer from ishemic heart disease (IHD), hypertonia and diabetes.

We could observe 36 patients, suffering from fflD, stable stenocardia (11-111 functional class), unstabi stenocardia, arteriosclerotical and postmiocardial infarction cardiosclerosis; 40 patients suffering from hypertonia; 95 patients suffering from diabetes (1 and 11 types). The age of patients with initial hyperlipidemia was 38-45;

WI Th secondary hyperlipidemia was 57-67. The ILBI was carried out with the light-quide outpu t power 1,5-3 mW during 20-30 minutes through a perypherical vein with He-NE laser <ALOC 1, ALOU - 2> (wavelength 630 nm). The cours consisted of 8-10 sessions which were held daily or every other day. The basic therapy of the magor pathology included according to the situation traditional therapy.

DYNAMICS OF HYPERLIPIDEMIA AND PERIPHERAL BLOOD FLOW IN PATIENTS WITH DIABETES MELLITUS AFTER THE COURSE OF COMBINED LASER THERAPY IN CONDITIONS OF OUT-PATIENT DEPARTMENT

Kovalyova T V et al.

It is known that diabetic angiopathy is a result of a generalized pathological metabolic disorder, lipid and carbohydrate metabolism in particular, when the increased rates of low-density lipoprotein cholesterol (LDL-C) and very low-density lipoprotein cholesterol (VLDL-C) in blood damage the endothelium.

Within the last 3 years in conditions of out-patient department we observed 218 patients with diabetes mellitus (DM), between 17-69 years of age. The lipidnormalizing effect we have studied in 27 individuals (8 men and 19 women). 7 patients suffered from insulin-dependent diabetes mellitus, 20 patients - from non-insulin-dependent diabetes mellitus. Mild form was registered in 6 patients, moderate - in 14, severe - in 7 patients. In patients studied the diabetic record averaged over 10 years.

We performed a staged course treatment by method of combined laser therapy (CLT) within the year. A course of therapy consisted of 8-10 procedures carried out daily (except Sundays). Repeated courses were given in 3 and 6 months.

To protect from the phenomenon of the . secondary exacerbation. we combined our therapy with a compulsory intake of a natural antioxidant AEVIT (vitamins A,E) in the dose of 600 mgs a day.

For the treatment we used intravenous laser blood irradiation (ILBI) by continuous helium-neon irradiation with the wavelength - 0,63 mm, capacity - 2 mW, exposure - 15-30 min (apparatus . ALOK-1. , . ALTO.). Simultaneously, we performed a percutaneous procedure by low-intensive laser irradiation (LILI) in the near infrared spectrum with the wavelength - 0,89 mm, capacity - 5-20 mW, in combination with magnetic nozzles (apparatus . Mustang.) on the following zones:

calf muscles - dose 4,5 J, frequency 80 Hz; exposure 4 min;

liver, pancreas, spleen projections - frequency 150 Hz, exposure 4 min on each zone.

To asssess the hypolipidemic action of CLT we investigated dynamics of total cholesterol (TC), triglycerides (TG), LDL-C, high-density lipoprotein cholesterol (HDL-C) and atherogenity rate (AR). We also controlled glycemia and peripheral blood flow.

Clinical improvements (decrease or disappearance of pain, cramps and paresthesia; . getting warmer. of limbs) have been registered from the first days of treatment. Insulin and sugarcorrecting medications dosages have been decreased 1,5-2 times. Together with subjective rehabilitation of patients, we registered a true increase of HDL-C rate (by 43,4%) with a simultaneous decrease of TC (35,6%), TG (28%) and LDL-C (27,6%). The AR reduced by 69,1%. The LDL-to-HDL cholesterol ratio decreased by 57,6%.

Thus, the positive dynamics of the examined parameters and the revealed hypolipidemic effect of CLT are the basis for its immediate inclusion in the treatment of patients with DM, associated with dislipoproteinemia and specific angiopathy. CLT may be also used as a preventive method in the treatment of patients without diabetic complications

Dynamics of lipid metabolism and peripheral blood flow rates in patients with atherosclerosis in conjunction with renal dysfunction after the course of combined laser therapy.

Kovalyova T V et al.

During an 8 year period patients with atherosclerosis and renal dysfunction have been treated with intravenous laser blood irradiation (ILBI). The study has demonstrated a decreased level of total cholesterol, LDL cholesterol and triglycerides with an simultaneous increase of HDL cholesterol levels. No pharmaceuticals were given during the treatment period. The authors state that ILBI results in a stable hypolipidemic situation which prevents atherogenesis in patients with metabolic disorders, particularly in patients with renal pathologies.

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