Diabetes

Clinical-pathogeneticlal aspects of combined laser therapy efficiency use in patients with diabetes mellitus, as compared with pharmacologic therapy.

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The use of combined laser therapy (CLT) in the treatment of patients with diabetes mellitus (DM) is a method of choice, allowing to reduce the pharmacologic dependence or to even avoid the intake of numerous drugs.

According to our long-term observations, the use of CLT allows to decrease the doses of sugarcorrecting medications in patients with insulin-dependent and non-insulin-dependent diabetes mellitus 1,5-2 times in the result of the first course of treatment. The application of CLT in patients with diabetic angiopathy of the lower limbs vessels corrects the disorders of macro- and microdynamics, hemorheology and immunity. The course treatment of such patients allows to preserve the stable compensation of diabetes mellitus and to stop the progression of diabetic angiopathy.

Thus, the wide application of CLT in medical practice gives the real possibility to reduce the death rates of diabetic patients of cardio-vascular diseases, coronary heart disease, severe renal pathologies, gangrene and other diabetic complications. It also improves the quality of life and capacity for work.

Dynamics of hyperlipidemia and peripheral blood flow in patients with diabetes mellitus after the course of combined laser therapy in ambulatory-polyclinic conditions.

Oprysko T V et al.

218 patients with DM were treated with laser blood irradiation. 93 patients had DM I type and 125 DM II type. A HeNe laser of 2 mW was used intravenously. In addition an infrared 890 nm laser (5-20 mW) was used for irradiation over the projections of the liver, spleen and pancreas. Treatment was given daily for a period of 8 days. Repeated sessions were given at 3 and 6 months. Sugarcorrecting medications were decreased 200%. From the first day the patients´extremities grew warmer, pain decreased and symptoms of encephalopathy decreased. Levels of total blood cholesterol, LDL cholesterol and triglycerides decreased to normal values with a simultaneous increase of alhpa-LP. Sugar concentration in blood also decreased.

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

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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 (đ< 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 (đ<0,05). AR lowered from 6,00± 0,23 tî 2,73± 0,10 (đ<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)	2,14 ± 0,10	8,20 ± 0,38	7,87 ± 0,37	0,99 ± 0,04	7,28 ± 0,27	7,94 ± 0,30
	II (2)	2,51 ± 0,11	7,98 ± 0,37	7,90 ± 0,37	1,14 ± 0,05	6,00 ± 0,23	6,92 ± 0,26
In 3 weeks	II (3)	1,69 ± 0,07	5,31 ± 0,25	6,63 ± 0,31	1,42 ± 0,06	2,73 ± 0,10	4,66 ± 0,18
	I	2,10 ± 0,12	7,91 ± 0,44	7,79 ± 0,44	0,92 ± 0,05	7,59 ± 0,42	8,46 ± 0,47
Changes, times	p (1 - 2)	1,3	1,54	1,2	1,4	3,3	2,0
	p (2 - 3)	> 0,05	> 0,05	> 0,05	> 0,05	> 0,05	> 0,05
	p (1 – 3)	> 0,05	< 0,05	> 0,05	> 0,05	< 0,05	< 0,05
		> 0,05	> 0,05	> 0,05	> 0,05	> 0,05	< 0,05
In 3 months:	II	1,72 ± 0,08	5,42 ± 0,25	6,21 ± 0,29	1,61 ± 0,07	2,37 ± 0,09	3,85 ± 0,18
Before therapy	II	1,51 ± 0,07	5,27 ± 0,24	5,42 ± 0,25	1,67 ± 0,07	2,15 ± 0,10	3,24 ± 0,15
In 3 weeks	I	2,12 ± 0,12	7,94 ± 0,44	7,84 ± 0,44	0,90 ± 0,05	7,82 ± 0,44	8,71 ± 0,49

In 6 months:	II	1,62 ± 0,07	6,01 ± 0,28	5,82 ± 0,27	1,39 ± 0,06	3,30 ± 0,15	4,18 ± 0,19
Before therapy	II	1,54 ± 0,07	5,28 ± 0,24	5,70 ± 0,26	1,42 ± 0,06	2,70 ± 0,12	4,00 ± 0,18
In 3 weeks	I	2,12 ± 0,12	7, 89 ± 0,44	7,80 ± 0,44	0,91 ± 0,05	7,67 ± 0,43	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)	14,21 ± 0,85	10,46 ± 1,46
	II (2)	11,27 ± 0,67	11,82 ± 1,65
In 3 weeks	II (3)	6,01 ± 0,35	7,45 ± 1,04
	I	14,32 ± 0,86	10,12 ± 1,04
	p (1 - 2)	> 0,05	> 0,05
	p (2 - 3)	< 0,05	< 0,05
	p (1 - 3)	< 0,05	< 0,05
In 3 months:	II	7,98 ± 0,47	6,38 ± 0,89
Before therapy	II	6,03 ± 0,36	5,72 ± 0,79
In 3 weeks	I	14,41 ± 0,86	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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The use of infrared laser therapy in patients with achrestic diabetes mellitus in sanatory conditions.

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Infrared laser therapy (IRLT) was performed in the sanatorium in 48 patients suffering from achrestic diabetes mellitus accompanied by ischemic heart disease. All patients studied at school for patients with diabetes mellitus and leamt the methods of self-control

and self-correction of the disease. 10 patients, who didn't get IRLT and didn't attend the school were included in the control group.

Blood cholesterol and lipids, blood pressure (BP), central hemodynamics (by the method ofechocardiography) and 24-hour ECG-monitoring were studied before and after treatment. Also the levels of glucose in blood and urine were determined repeatedly, and the body weight was controlled.

The statistically proven increase of minute volume, ejection fraction and cardiac index was found in patients who had undergone IRLT. The episodes of painful and painless miocardial ischemia. Levels of cholesterol and blood glucose and body weight decreased. Aglucosuria was marked as well. None of the above indices in the control group changed significantly.

The effect of low-level laser irradiation and preparation mexidol at the hemocoagulative system in patients with diabetes mellitus

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The present paper discusses the results obtained during our researches on changes which develop in the hemocoagulative and fibnnolythic blood system in patients with necrotic processes in soft tissues suffering of diabetes mellitus when they are treated with intravascular low-level blood irradiation and antioxidant Mexidol.

Infrared laser therapy influence on blood circulation in patients with diabet distal polyneuropathy.

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96 patients with DDPNP received infrared lasertherapy. Their bloodflow including parameters of microcirculation issas carefeully exarnined.

Laser therapy stimulated microcirculation in both groups of patients with microcirculation disorders alone and with the combination of marked micro -and makrocirculation therapy disturbances. High effectiveness of Laser in DDPNP was proved.

Authors conclude that laser therapy is a pathogenic method of DDPNP treatment.

Dynamics of renal function in patients with acute pyelonephritis and diabetes treated with magnitolaserotherapy

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We studed 98 patients with acute pyelonephritis and diabetes, 62 (63,3 %) patients out of them with not complicated forms , with complicated 36 (36,7 %). The renal function was controled on the base of clinical sings, biochemical and radioimmunological data. Renal disfunction was revealed in all patients. Reani disfiinrion of the first degree in patients with not complicated pyelonephritis was diagnosed in 36 (58%), the second degree - in 21 (34%), the third degree - in 5 (8%) patients. Rean] disfiinrion of the first degree in patients with complicated pyelonephritis was diagnosed in 11 (30.6%),the second - in 17 (47.2 %), the third degree in 8 (22.2 %).
Patients with complicated pyelonephritis were treated after restoration of urine outflow by upper unnary tract. Kidney catheterisation was performed in 32 (88.9%) patients, trancutaneal kidney puncture - in 4 (11.1%) patients. Besides antibiotics, detoxical therepy all patients were threated with magnitolaserotherapy useing "MILTA" apparatus. bi patients with not complicated pyelonephritis the renal function has normalized in 21 patients (33,9 %), first degree renal disfunction was found in 26 (41,9 %), second - in 15 (24. %). The improvement of renal disfunction by one degree was revealed in 29 (46,7 %) patients, in 8 (12,9 %) by two degrees. In patients with the complicated pyelonephritis the renal function has normalized in 7 (19 %), the first degree renal disfunction - inIO patients (27,7 %), the second - in 13 (36 %),the third -in 6 (16,6 %), improvement of renal disfunction by one degree was revealed in 11 (30.6%), by two degrees – in 2 (5.6%) patients.
The results received are explained by positive medical effect of magnetolaserotherapy on inflammatory process in kidneys and renal function. Such effect is caused by improvement of microcirculation and reduction of kidneys tissue edema.

Application of medical laser for diabetes mellitus complex treatment.

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We have a many years experience of I and II type diabetes mellitus complex treatment when medical laser (ML) is used, have elaborated the indications and the contra-indications to apply intravessel laser blood irradiation (ILBI), transskinlascr irradiation, lascracupunture. The optimum exposition has been motivated for each method ML. We have drawn a conclusion about necessity of two weeks patients preparation for ML by contra-agregations and contra-oxidantes. Without this, spontaneous thrombocyte agregation increases and disorders offibrinolysis increase too. The threat ofthrombohemorragic complications rises. ILBI influence upon carbohydrate metabolism depends on glycemia initial level: if it is decompensation, ILBI redoubles it; if it is compensation, hypoglycemia is possible after procedure. ML removes asthenia, polyneuritis, makes hypotensive effect when arterial hypertension takes place, promotes lowering of the excessive body massa. ML is effective in case of diabetic macroangiopathy, in particular it is managed to lower the dose of antianginal remedies or to abolish them, when ischemic heart desease occurs; lipidogramma improves or normalizes. After ILBI positive dynamics of diabetic retinopathy was discovered, that proves the effectivness ML for treatment and prophylaxis of microangiopathy. ML removes lipoid necrobioses completely. So, ML roust be used for diabetes mellitus complex treatment.

In-vein laser blood irradiation (ILBI) in comples treatment for patients with diabetes (D).

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Diabetes is generalised pathological metabolic disorder which leads to the affection of the vascular system including all the capillary blood vcscls. Further vascular complications (diabetic foot, rctmopahy, ne-phropathy, insult) cause early disability and high death rate. The increase of the level ofglickcr blood proteins (HbA I, Hb Ic) is correlated with the disorder in the system of hacmostasis and hacmorcologi (the growth of aggregation of blood sticking elements) and dislipidcmy (growth of atcrogcnic fractions of the lipidogram, especially of the total cholesterol and triglyccrids). The correction if the disruption of the peripheral blood circulation is one of the most important factors in D complications treatment. Improving microcirculation at the expense of lowering the spontaneous aggregation level, increasing the crythro-cytc deformation and consequently, normalising the level of effective metabolism is one of the major effects the helium-neon laser low intensity irradiation produces on biological tissues. The ILBI was included in the complex treatment of 107 D patients (15% of DI type, 85% of D2 type) with different dcgrics of heaviness. 22% had suffered from D for less 10 years, 78% for more than 10 years. The treatment was performed with ALOC-1 and ALOU-2 (wavelength 630 nm with the light guide output power 1,5-3 m\V during 15-30 min). The drug treatment consisted of the correction jf the carbohydrate metabolism, dctoxica-tion treatment, vitamins treatment, angioprotcctors and diagrcgants. As a result, together with the subjective rehabilitation of the patients, the total cholesterol and triglyctrids were reduced as low as the norm or its limit which distinguished these patients from those without the ILBI. Thus the application of in-vein laser blood irradiation in complex treatment for patients with D can be regarded as an important and necessary component of angiopathy prophylactic (D-l type) and reaching a longer remission in cases of micro- and macroangiopathy (D-2 type).

THEORETICAL BACKGROUNDS FOR LIGHT APPLICATION IN DIABETES

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Glucose can act as an oxidizing agent in glycation breakdown depending on the composition of surrounding molecules. Glucose reacts nonenzymatically with protein amino groups to initiate glycation, the early stage of the Maillard reaction, leading to crosslinking and browning of the proteins via the formation of advanced glycation end products (AGEs). The AGEs are responsible for various biochemical in tissues which can lead to the development of several complications in diabetes: neuropathy, angiopathy.

The monocyte macrophage plays an important role in this process both by removing the senescent molecules that have accumulated AGEs over time and by initiating the steps that lead to new protein synthesis and tissue remodelling. One of the most important features of the macrophage is its ability to produce and release NO and SOD. The

irradiation of macrophages by red light result in a dose-dependent increase in NO production and SOD activity and, laser irradiation of cells in the red range activates the synthesis of SOD and inducible NO-synthase de novo due to photosensitized initiation of free radical reactions.

NO synthase is primarily a cytosolic enzyme which has similarities with cytochrome P450 enzymes. These all have absorption maxima between 446 nm and 452 nm. Several isoforms of the enzyme occur in endothelial cells, as well as in platelets, macrophages, vascular smooth muscle cells, and the brain.

The start of pathogenic levels of Islet cell antibodies (ICA-IgG) may precede the clinical onset of diabetes by several years, even in children. Several attempts have been made to influence the course of type I diabetes by immunotherapy. Plasmapheresis, prednisone, and interferon have proven unsuccessful or only partially successful. Successful methods of preventing diabetes in Worchester rats have been neonatal thymectomy, antiserum to lymphocytes, bone marrow transplantations, and cyclosporine. This demonstrates the strong immunological background of the disease process. Type I diabetic patients have been shown to have inhibition of migration of leucocytes specific for antigens of the endocrine pancreas. Phagocytic white blood cells employ the myeloperoxidase H202 system to generate reactive oxygen intermediates that kill invading bacteria, viruses, and tumour cells. Partially reduced oxygen species are also potentially damaging to cellular lipids, nucleic acids, and proteins; the production of such species by activated phagocytes has been implicated in the damage of normal tissues under pathological conditions. The initial pathway for oxidant generation involves a membrane associated NADPH oxidase that reduces oxygen to superoxide anion, which then dismutates to form H202 . Myeloperoxidase, a secreted heme protein, amplifies the toxic potential of H202 by producing reactive intermediates. Production of myeloperoxidase is inhibited by irradiation at 633 nm 660 nm, 820 nm, 880 nm and 950 nm, of which 660 nm appears to have the strongest effect.

By regulating the amounts of active macrophages, NO, SOD, Myeloproxidase, and the activity of cytochrome P450 and many other substrates by light, it is possible to regulate glucose and AGE breakdown and prevent development of complications of diabetes

THE LOW INTENSIVE LASEROTHERAPY OF THE LATE COMPLICATIONS IN DIABETES MELLITUS ?

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The results of the low intensive laserotherapy (LILT) were assessed in patients with diabetic angiopathies. The authors used infra-red laser, worked in impulse regime with outcome capacity of 5 watt. Biological active points were found with the help ofElectrone Marker of Acupuncture Points and were influenced for 16-20 seconds each, 3-15 minutes in general. The course of the laserotherapy (LT) consisted from 10-12 treatments. The results were analysed according to the clinical and laboratory methods, including the study of the lipid peroxidation (LP) with the help ofmalonil dialdehyd (MDA) level in

serum. The functional status of the blood flow was tested by the retrobulbar conjunctivas biomicroscopy, rheoencephalo- and rheovasography. After LT clinical improvement (grow warmer of the extremities, decrease or disappearance of pain, cramps and parastesies) was marked in 89% of patients. Normalisation of the small arteriole tonus, improvement of the pulse curve form and configuration, as well as pulse blood filling in caroted and vertebral arteries, decrease of the irregularity of the retrobulbar conjunctivas vessels gauge with partial or total disappearance of sladge-phenomenon were shown. The restoration of the blood flow promoted improvement of the electro-, enchephalo- and miographical indexes. The tendency to the normalisation ofLP was marked as well. MDA level decreased from 13.4±0.56 to 10.9±1.2 mmol/1, but stayed higher than in donors (5.5±0.17 mmol/1). These data confirm the positive influence of LILT at LP, function of the central and peripheral blood flow and permit to use LILT in the complex therapy of the vascular complications in diabetes mellitus.

QUANTUM THERAPY OF DIABETIC NEPHROPATHY

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The influence of low energy helium-neon (HN) and infrared (IR) laser irradiation on the clinical laboratory indications of 33 patients with insulin dependent diabetes mellitus was studied. It was shown that laser therapy must be prescribed strictly individually for each case taking into account the immune status of the organism. Laser therapy is effective only at the early stages of renal disorder. HN laser irradiation of kidneys is accompanied by activation indications of primarily humoral immunity while in case ofIR laser irradiation these are activation indications of cell-bound immunity. Considering the partially auto-immune nature of kidney affection this phenomenon can be regarded as a positive factor which liquidates immunity deficit on the one hand and as a dangerous tendency of the activation of some nephron alteration mechanisms on the other. The difference in the therapeutic effectiveness of the two kinds of lasers is connected with the different penetrating power of the rays and changes in the organism's photochemical processes which depend on the wavelength and irradiation power.

Low Power Laser Therapy is the best non -invasive and more expensive treatment for D.A.

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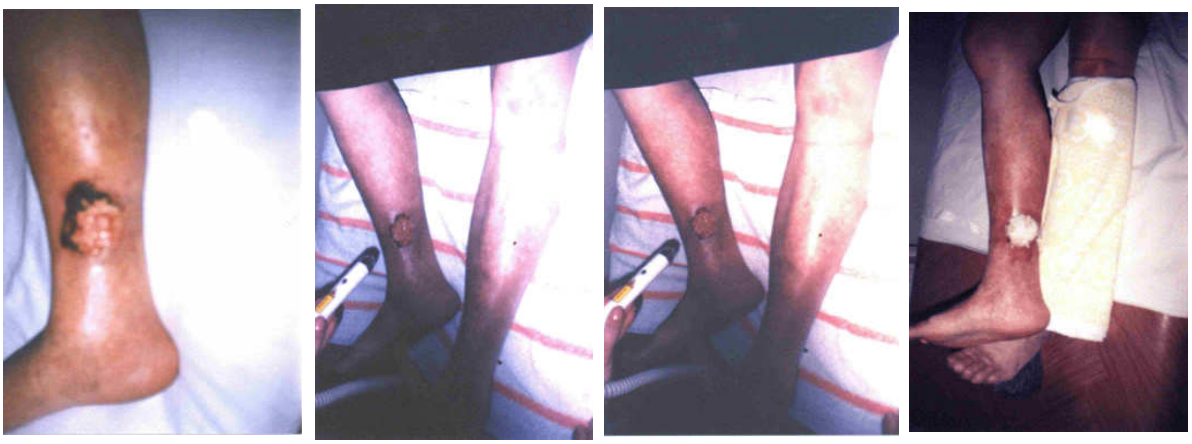
PHOTO:"The effect of laser irradiation for D.A."

 @ We hava a pleasure to introduce an editorial by Dr.Christian Zaharia from Romania.

The lower limbs diabetic arteriopathy (D.A.) is the most frequent place of mellitus macroangiopathy, with evolution towards aggravating:
Ulceration, necrosis and finale apopthosis of tissues. With all accomplished progress in medical treatment of arteriopathy, especially in distal complications, the resultats are not encouraging. On the basis of the clinical experience, the author consider that the LOW POWER LASER therapy is a future in treatment of ulceration and necrosis.
Personal I used a HE-NE laser (type Laser Instruments-Poland);
- wave length 630 ~ 670 nm, output 35 mW, energy dose J/cm 4, time 4 min. (progressive 6 min., 4 sessions / week, 20 sessions continous beam. The last 6 sessions was combined with sessions of ORIENTAL MEDICINE (laser acupuncture - biostimulation therapy).
LP Laser Therapy induce arteriolar vasodilatation, suppress pain and vascular spasm. The values of paraclinical parameters (Doppler examination, cutaneous temperature, etc.) are changed.
The patient can be rehabilited in 3-4 months.
Conclusion : Low Power Laser Therapy is the best non -invasive and more expensive treatment for D.A.

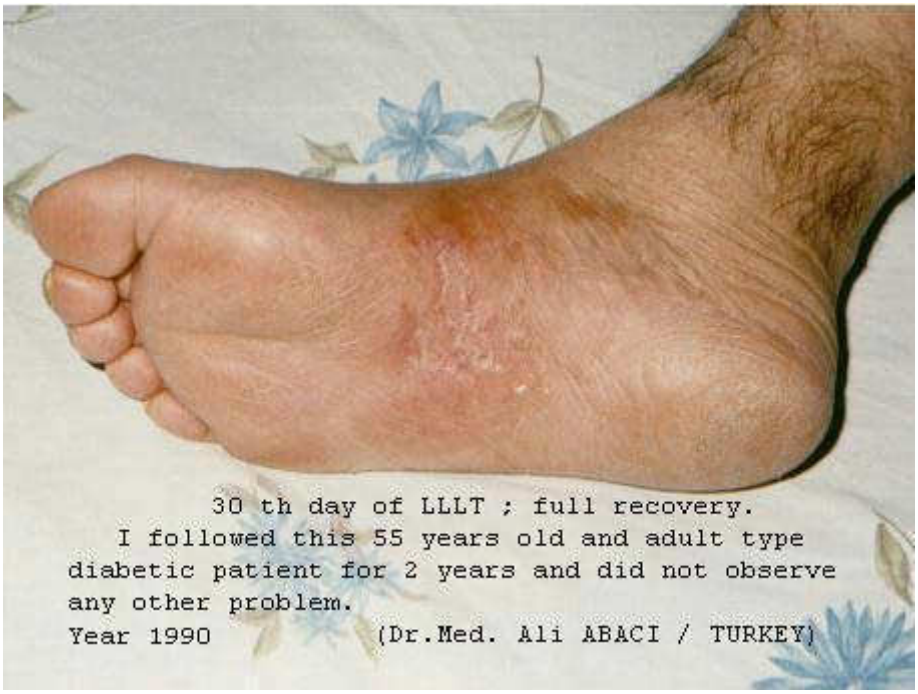


At the start of lpl therapy

The management of diabetic neuropathic ulceration by HeNe laser.

The following photo sequence has been contributed by Dr. Ali Abaci, Turkey

Webmaster comment: Sometimes pictures illustrate better than words what laser therapy is all about.
Please note that the dose is 0.4 J/cm2, not 4 J/cm2 as indicated in the text on the photos below.



Treatment parameters for the diabetic neuropathic ulceration are given below : He-Ne Laser, wavelength 632 nm. Continuous Wave Beam Area(cm2)= Diameter(cm)2 x 0.7854 = (3.1 x 3.1) x 0.7854 = 7.547 cm2 Laser Output Power = 5 mW= 0.005 W Laser Output Power(W) Power Density(W/cm2)= Beam Area(cm2) 0.005 == 0.0006625 W/cm2 7.547 Energy Density(J/cm2)= Power Density(W/cm2) x Time(sec) = 0.0006625 x 600 = 0.3975 J/cm2 = ~ 0.4 J/cm2. Treatments were given once a day, 5 days a week, totally for 4 weeks.

Laser and Plaquex treatment on cryoglobolic vasculitis on diabetic foot (Case report summary)

By Anita Baxas, Binningen, Switzerland

A 53-year old male patient presented himself with non-insulin-dependent diabetes mellitus since 5 years as well as an active hepatitis C infection of unknown cause and duration. He developed inflamed and swollen blisters on his first and second toes of his right foot over night. The head of the dermatological outpatient clinic at the University hospital of Basel, Switzerland diagnosed a vasculitis due to cryoglobulins caused by the hepatitis C infection. Within a few days the tips of the toes turned purple and the danger of an amputation increased due to the reduced capillary blood flow caused by diabetes (left photo). We treated the patient locally with Low Level Laser therapy to promote wound healing and intravenously with Plaquex infusions to improve capillary blood circulation. After 3 weeks of treatment with a total of 10 Plaquex infusions and daily application of laser therapy (in-office and with home care laser) we could promote granulation to the point that the wounds healed completely without sequel (right photo, after 3 weeks).

Material and Method:

- Doctor's Office:

Laser Model Med-2000 (LASOTRONIC Baar Switzerland), Output 120 mW (3 Diodes plus red pilot light) approx. 30° divergence. Wavelength: 830 nm (infrared). Mode c.w. (continuous wave), distance from wound: 0.5 - 1 cm. Dose: 4 joules/ cm2. Frequency: daily treatments (5 x per week) for 3 weeks (15 treatments). Duration per toe: approx. 30 minutes total.

- Home treatment:

Laser Model Med-130 (LASOTRONIC Baar, Switzerland). Output: 45 mW 830nm (1 Diode, approx. 30° divergence). Mode c.w. (continuous wave), distance from wound: 0.5 - 1 cm. Dose: 4 joules / cm2, 3 - 4 treatments daily for 3 weeks.

Vopr Kurortol Fizioter Lech Fiz Kult. 2002 Jul-Aug;(4):9-11.

[Use of infrared laser therapy in patients with ischemic heart disease associated with diabetes mellitus type 2 in health resort]

[Article in Russian]

Zin'kovskaia TM, Zavrazhnykh LA, Golubev AD.

Infrared laser therapy (300 Hz) combined with balneotherapy and patients' education is more effective than standard sanatorium rehabilitation in patients with ischemic heart disease associated with diabetes mellitus type 2. 81.8% patients showed good response manifesting in less frequent anginal attacks, episodes of pain and painless ischemia and lower doses of antianginal drugs. Systolic and diastolic arterial pressure lowered by 18 and 10 mm Hg on the average, respectively. Multimodality rehabilitation of IHD patients with type 2 diabetes mellitus improves hemostasis, carbohydrate and lipid metabolism. Coronary circulation response lasted for 24 weeks.