

Hypertension – Vascular Disease

[Vopr Kurortol Fizioter Lech Fiz Kult.](#) 2005 May-Jun;(3):13-7.

[Metabolic determinants of efficacy of infrared laser therapy in hypertensive patients with combined pathology]

[Article in Russian]

[Krysiuk OB](#), [Ponomarenko GN](#), [Obrezan AG](#), [Kostin NA](#).

By a distinct pathogenetic direction of a therapeutic action of laser therapy (LT) on different regulators of blood pressure (BP) and metabolism, 109 patients with essential hypertension (EH) and atherosclerosis and/or diabetes mellitus were studied for LT efficacy depending on metabolic disorders. LT demonstrated metabolic neutrality and unefficacy in patients with multiple marked disorders of fat metabolism and hyperglycemia. Metabolic factors determining LT efficacy comprise hypercholesterinemia, hypertriglyceridemia and hyperglycemia. The factorial analysis points to essential factor restructuring in metabolic disorders. The obtained equation of multiple regression allows prognostication of the degree of a fall of mean BP in response to LT depending on the degree of metabolic disorders.

[Efficiency of low-intensity laser radiation in essential hypertension].

{Klin Med(Mosk). 2001; 79 (1): 41-44. Velizhanina I A, Gapon L I, Shabalina M S, Kamalova N N.

In a placebo-controlled study an antihypertensive activity of low-intensity laser radiation (LILR) was evaluated in 52 males with essential hypertension stage I. The placebo group consisted of 14 matched patients. LILR was used as monotherapy of 10 daily procedures. This treatment significantly lowered systolic, diastolic and mean arterial pressure. Moreover, diastolic arterial pressure did not rise high at submaximal bicycle exercise. Total peripheral vascular resistance also decreased. A good hypotensive effect was achieved in 90.4% cases. Thus, LILR is a highly effective treatment in essential hypertension stage I.

[The efficiency of low-intensity laser radiation in the treatment of arterial hypertension complicated by ischemic heart disease]

[Article in Russian]

Shuvalova IN, Klimenko IT, Svinina NG, Tsereteli MV, Zankina VG, Miasoed FR.

The efficiency of low-intensity laser radiation (LILR) was studied in the treatment of 291 patients with arterial hypertension and ischemic heart disease. Clinical grounds are given for use of LILR red and infrared rays in rehabilitation of hypertensive patients with ischemia. The rehabilitation regimens can be differentiated according to the disease severity, type of hemodynamics, state of cerebral circulation.

Vopr Kurortol Fizioter Lech Fiz Kult. 2001 Jul-Aug;(4):3-6.

Lik Sprava. 1998 Oct-Nov;(7):141-3.

[The effect of low-intensity laser radiation in the infrared and red ranges on arterial pressure regulation in patients with borderline hypertension]

[Article in Russian]

Shuvalova IN, Klimenko IT, Zhukova LP, Oborin IuI.

Effectiveness was studied of low-intensity laser irradiation on regulation of arterial blood pressure (BP) in 185 patients (51 men, 134 women). The above patients were prescribed four therapeutic complexes: group I was exposed to infra-red irradiation by zones; group II--to scanning Helium-Neon laser across the portal zone and paravertebrally CIII-Th5; group III--to helium-neon laser in the area of right sinocarotid zone; group IV underwent hydrolaser shower (in red and infra-red range). Complaints were studied as were data from laboratory investigations, the condition of different bodily systems, BP level, the functional state of the cardiovascular system as per electrocardiography and rheography findings. A positive clinical effect was achieved in all the groups studied. Employment of low-intensity laser irradiation in the rehabilitation of patients with borderline hypertension during the sanatorium stage was noted to strikingly enhance the efficiency of the therapy administered. It can be prescribed to patients irrespective of their hemodynamic types. Irradiation of the right sinocarotid zone and hydrolaser therapy are indicated to patients presenting with hypo- and eukinetic types of hemodynamics and baseline sympathicotonia.

Lik Sprava. 1997 May-Jun;(3):110-1.

[The effect of plasmapheresis and laser irradiation of the blood on the hemorheological and hemodynamic indices in hypertension patients]

[Article in Russian]

[Alizade IG, Karaeva NT.](#)

Results are submitted of investigation designed to study effects of a combined use of plasmapheresis and laser irradiation of blood on hemorheologic and hemodynamic characteristics in 36 patients with stage II hypertensive disease. The course exposure of

patients to a combined use of plasmapheresis and laser irradiation of blood led to a drop of arterial pressure in different hemodynamic groups at the expense of different parameters characterising the hemodynamic status. Thus combined use of plasmapheresis and laser irradiation of blood can be considered a promising nonmedicamentous therapeutic alternative in patients with hypertensive disease being associated with a drop of arterial blood pressure, and what is more, improvement in viscous- and elastic properties of blood as well as its hemodynamic indices.

Med Tr Prom Ekol. 1996;(8):10-2.

[Effects of laser therapy on psychophysiological parameters and arterial blood pressure in drivers with hypertension]

[Article in Russian]

[Umetov MA.](#)

The study covered possibility to use laser therapy for correction of arterial hypertension in car and track drivers suffering from high blood pressure. Laser irradiation of infrared waves with wavelength of 0.89 micrometers appeared to have positive influence on the drivers facing arterial hypertension.

Lik Sprava. 1994 May-Jun;(5-6):29-32.

[Experience in the use of autotransfusions of laser-irradiated blood in treating hypertension patients]

[Article in Russian]

[Alizade IG, Karaeva NT.](#)

Autotransfusion of laser light-irradiated blood (5-7 sessions) was found to facilitate a steady arterial blood pressure fall by an average 24% of the initial level in patients with hypertensive disease. Drop in the arterial blood pressure following the course of autotransfusion of laser light-irradiated blood was accompanied by improvement in general condition of the patients, enhancement of the effectiveness of antihypertensive preparations, favourable shifts in immunological and haemorheological indices. After discharge from hospital beneficial clinical effect persisted for up to 4-8 months. The preliminary data obtained suggest that autotransfusion of laser light-irradiated blood may well be used as adjunct to a complex of therapeutic measures to be taken to control hypertensive disease.

[Vopr Kurortol Fizioter Lech Fiz Kult.](#) 1996 Mar-Apr;(2):3-5.

[The laser therapy of patients with hypertension in combination with

coronary insufficiency]

[Article in Russian]

[Kniazeva TA](#), [Badtieva VA](#), [Zubkova SM](#).

Hypertensive patients with coronary insufficiency have received infrared ($\lambda = 0.85$ microns) laser radiation to the skin. The treatment is shown to have antianginal, antihypertensive effects, to improve cardiac performance, myocardial contractility, to increase myocardial, coronary and aerobic reserves. This clinicofunctional efficacy is accompanied by positive shifts in lipid metabolism, lipid peroxidation activity, antioxidant defense, hemocoagulation and microcirculation.

Gig Tr Prof Zabol. 1992;(4):32-3.

[The correction of hemodynamic disorders with low-intensity infrared laser radiation in agricultural machinery operators with borderline arterial hypertension]

[Article in Russian]

[Mokretsov VV](#), [Utts SR](#).

Data on the influence of low-intensity infrared laser on the central and peripheral hemodynamics in 76 agricultural machine operators facing transitory arterial hypertension are presented. Analysis revealed that low-intensity laser is more effective at the early stages of cardiovascular diseases. Low-intensity infrared laser exposure of reflexogenic zones can be effectively used to correct hemodynamic disorders in subjects facing transitory arterial hypertension.

[A possible mechanism of the hypotensive effect of laser irradiation in patients with ischemic heart disease with arterial hypertension]

[Article in Russian]

Vasil'ev AP, Strel'tsova NN.

93 patients with ischemic heart disease, 44(47.3%) of them with arterial hypertension, were exposed to laser irradiation (LI). LI was accompanied with lowering of arterial pressure, more prominent in hypertensive patients. Mechanism of the hypotensive effect of laser therapy operates largely through stabilization of the lipid bilayer of the cell membrane demonstrated on the model of erythrocyte.

Vopr Kurortol Fizioter Lech Fiz Kult. 2001 Jan-Feb;(1):15-8.

[Evaluation of the effectiveness of normobaric hypoxia and low-intensity laser radiation in hypertensive patients from 24-hour arterial pressure monitoring data]

[Article in Russian]

Velizhanina IA, Evdokimova OV.

A randomized parallel study was performed to compare the antihypertensive effect of normobaric hypoxia and low energetic laser irradiation in 57 patients with essential hypertension stage I using 24-hour blood pressure monitoring. High hypotensive efficacy of both methods is demonstrated. A course of normobaric hypoxia decreased mean 24-h and mean daytime systolic and diastolic blood pressure. Low energetic laser irradiation reduced mean 24-h, mean daytime and mean night systolic and diastolic blood pressure.

Vopr Kurortol Fizioter Lech Fiz Kult. 1998 Jan-Feb;(1):9-11.

[The laser therapy of hypertension patients in the initial stages]

[Article in Russian]

Velizhanina IA, Shabalina MS, Gapon LI, Kamalova NN, Sergeichik OI.

The effect of low-energy laser irradiation used as monotherapy was studied in 42 patients with early essential hypertension. Hypotensive and antioxidant effects of laser therapy, its ability to decrease total peripheral resistance were more pronounced in patients with stage I hypertension.

Fiziol Zh. 2003;49(1):104-8.

Vopr Kurortol Fizioter Lech Fiz Kult. 2003 Mar-Apr;(2):7-10.

[Laser-, ultraphono-, and acupuncture in complex treatment of patients with hypertension]

[Article in Russian]

Sobetskii VV.

368 patients with hypertensive disease stage I and II were examined and treated either with laser puncture or acupuncture. Laser puncture was effective at stage I of hypertensive disease while acupuncture had a more potent hypotensive effect and can be used both in hypertensive disease stage I and II. Action on the acupuncture points and zones normalizes also parameters of the central and peripheral hemodynamics in hypertensive patients.

Vrach Delo. 1990 Jun;(6):19-21.

[The effectiveness of laser puncture in hypertension patients]

[Article in Russian]

[Odud AM, Potapenko PI.](#)

A study is presented of the results of laser puncture in combination with drug treatment of patients with hypertensive disease using an association of different acupuncture points. The values of hemodynamics were evaluated by routine techniques of tetrapolar chest rheo- and kinetocardiography. The use of laser puncture allowed to reduce the dose of hypotensive drugs.

Vrach Delo. 1991 Jul;(7):34-6.

[The use of laser puncture for managing hypertensive crises]

[Article in Russian]

[Odud AM, Potapenko PI.](#)

The authors report efficacy of using laser puncture and pointed massage in controlling hypertensive crises in patients suffering of hypertensive disease. The arterial pressure was reduced mainly due to decrease of the peripheral resistance. This method of treatment was more effective in patients with moderate and significant hypertrophy of the left ventricle as compared with patients showing marked hypertrophy of the left ventricle.

Kardiologiya. 1991 Feb;31(2):67-70.

[Optimization of the treatment of patients with hypertensive disease from the rheological viewpoint]

[Article in Russian]

[Shabanov VA, Kitaeva ND, Levin GIa, Karsakov VV, Kostrov VA.](#)

The efficacy of various modes of correcting rheological disorders (membrane-protective agents, laser irradiation, plasmapheresis) was compared in hypertensive patients. In 30% of the patients, the conventional antihypertensive therapy was demonstrated to deteriorate hemorheological parameters, which was due to its atherogenic impact on the blood lipid spectrum. Essential phospholipids, laser irradiation, and plasmapheresis, which are supplemented to the multimodality therapy promote a significant improvement of hemorheological parameters, which makes it possible to recommend them for management of hypertensive patients with a stable (essential phospholipids), complicated (laser irradiation), and refractory (plasmapheresis) course.

Ter Arkh. 2001;73(10):70-3.

[Changes in blood rheological properties in patients with hypertension]

[Article in Russian]

Shabanov VA, Terekhina EV, Kostrov VA.

AIM: To study hemorheology in patients with essential hypertension (EH), to improve EH treatment in terms of blood rheology. MATERIAL AND METHODS: Blood rheology, microcirculation, lipid plasm spectrum, central hemodynamics were studied in 90 patients with mild and 83 patients with moderate or severe EH as well as 30 healthy controls before and after treatment (hypotensive drugs, essential phospholipids, intravenous laser blood radiation, plasmapheresis). RESULTS: Hemorrheological disorders (subnormal deformability of the red cells and elastoviscosity of their membranes, disk-spherical transformation and hyperaggregation of blood cells, high dynamic viscosity) correlated with the disease severity, arterial pressure and total peripheral vascular resistance. Long-term (1-1.5 years) hypotensive therapy, especially with combination of beta-blockers with diuretics, has a negative effect on blood rheology. Optimisation of EH treatment in terms of blood rheology consists in using essential phospholipids in stable hypertension, intravenous laser radiation in complicated hypertension, plasmapheresis in drug-resistant hypertension. Such an approach not only significantly improves hemorheology but also provides good clinical and hypotensive effects in 75-80% patients. CONCLUSION: Blood viscodynamics should be taken into consideration in individual treatment of hypertensive patients.

[Effect of infrared laser irradiation on the arterial blood pressure in liquidators of the accident at the Chernobyl power plant]

[Article in Ukrainian]

Korkushko OO.

Kiev Medical Institute UAPM.

Liquidators of Tchernobyl accident with discirculatory post-irradiation encephalopathy were treated with infra-red lazer irradiation together with a half doze of pharmacological agents usually used. Infra-red lazer irradiation has been shown to result in a significant reduce in the arterial pressure level, so it can be effective in correcting the disturbances in haemodynamics.

Sov Med. 1990;(3):21-3.

[Intravenous laser irradiation of the blood in occlusive vascular diseases of the extremities]

[Article in Russian]

[Shval'b PG](#), [Zakharchenko A Ia](#), [Sigaev AA](#), [Kataev MI](#).

The authors analyze the results of clinical application of intravenous He-Ne laser irradiation of the blood in patients with obliterating diseases of the limb vessels. Starting from 1984, this method was employed in the treatment of 133 patients, of these 102 ones with atherosclerosis obliterans of the lower limb vessels, 17 with endarteritis obliterans, and 14 with Raynaud's syndrome. Intravenous laser therapy proved to be the most effective in atherosclerotic involvement of the vessels, when positive result was achieved in 77.5 percent of patients. The length of remission was up to 6 months. The method of treatment is described.

From http://www.informnauka.ru/eng/2005/2005-09-13-5_66_e.htm

GENOTYPE OF HYPERTENSIVE PATIENT DETERMINES TREATMENT SUCCESS

**St. Petersburg , Chair
of Balneology and
Physical Therapy,
Kirov Army Medical
College
13.09.2005**

Success of hypertension treatment depends on how well the chosen treatment mode matches the patient's genotype. Specialists of the Chair of Balneology and Physical Therapy (Kirov Army Medical College) have determined how the hypertensive patient's genotype impacts the efficiency of magnetic-laser therapy.



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Photo, pictures:

Keywords:

Primary hypertension is one of the most frequent diseases, the treatment of which is still a problem to contemporary medicine. The disease is determined by some genes, each of the genes may exist in several variants. Respective combination of these genes forms the so-called "risk threshold" of disease origin. The major contribution to the hypertension evolution is made by the genes of angiotensinogen (AGT), angiotensin converting enzyme (ACE) and some others. Their combination determines not only the risk of disease occurrence, but also a potential success of its

treatment. Thus, adrenolytic drugs act differently on central hemodynamics depending on the AGT and ACE genes' polymorphism. Besides drug therapy, there exist physical treatment modes, specifically - magnetic-laser therapy. The St. Petersburg physicians have researched how its effectiveness depends on genotype.

Magnetic-laser therapy effectiveness was evaluated with 101 patients with different variants of genes' polymorphism. The polymorphism itself was determined with the help of the polymerase chain reaction, having taken some venous blood from the patients. Participants to the experiment underwent a radiation treatment course consisting of ten everyday sessions, the patients being examined before and after the course. Physicians watched the blood pressure changes within 24 hours and the reaction to physical activity (the patients were placed on the bicycle ergometer). Polymorphism of different genes determines the clinical behavior and treatment effectiveness to different extent. Magnetic-laser therapy helps the majority of hypertensive patients. The ACE gene has the highest influence on the magnetic-laser therapy results. In case of one variant of polymorphism (it is called MM- polymorphism) the blood pressure falls down to the greatest degree. The researchers have also found the combinations where the effect is the lowest (this is TT-polymorphism of the angiotensinogen gene). It is interesting to note that the variant of angiotensin converting enzyme (ACE) polymorphism is the worst for success of magnetic-laser therapy but it is optimal for drug treatment of high blood-pressure.

There are several genes that determine effectiveness of hypertension treatment. To clearly perceive their joint impact it is necessary to continue the research. However, it is evident already which genes determine to the largest extent the blood pressure and the value the blood pressure can be lowered in this or that way. Probably the patients will be soon undergo genetic blood test first, and then, depending on its results, the treatment will be prescribed.

"Chemistry and Life - XXI century

Low Level Laser Therapy in the Treatment of Arteriosclerosis of the Lower Limbs

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Abstract

Twenty patients with arteriosclerosis in the lower limbs were treated by low level laser therapy with lumbar paravertebral application a 20mW continuous wave He-Ne laser(632nm) and simultaneously a 250mW continuous diode laser (830 nm) was applied transcutaneously to the lumbar region by the scanner for 30 minutes 6 days per week for 2 months. The mean value of

percentage of success was 87.2%. The results of the study indicate that low level laser therapy can influence beneficially arteriosclerosis in the lower limbs which is generally difficult to treat.

Introduction

Arteriosclerosis is a chronic obliterative disease affecting the lower portion of the aorta, its main branches and the arteries supplying the extremities. The condition occurs predominantly in patients between the ages of 45 and 70 years. It is present much more frequently in males than in females. It may be caused by an error in the metabolism of lipids (Oliver, 1955). Buck (1959) believed that the abnormal vascularization of the arterial wall has also been proposed as a significant factor in the development of the disease. Also, the Question of heredity as a factor in the pathogenesis of the disease must be raised (McKusick, 1958). The patient complains of pain in the extremities typical of intermittent claudication and difficulty in walking, finally rest pain is experienced particularly at night, characterized by a sensation of coldness or burning, hyperesthesia and tingling (Abramson, 1974). The purpose of the study was to evaluate the efficacy of low power laser in the treatment of arteriosclerosis. Materials and methods Twenty patients with arteriosclerosis of the lower limbs from the out-patient clinic of the General medicine Department of both Tanta University Hospital and Alhikmah Hospital, Mansoura were included in the study. The male to female ratio was 4:1. The ages ranged from 45 to 69 years. The duration of symptoms ranged from one to 8 months (table 1). The patients were experiencing pain in both calf muscles after walking distances (claudication distance) ranging from 200 to 500 meters. Three patients experienced rest pain at night. Clinical examinations revealed palpable walls of superficial arteries, particularly the dorsalis pedis. In the study, the claudication distance was determined for every patient in meters prior to treatment. Control normal individuals within the patients' age group walked an average of 1500 meters without experiencing calf pain.

Results

Pain was relieved in 16 patients who received 3 to 7 courses of treatment. Eight patients were able to walk 1500 meters without experiencing any pain in the calf muscles, hence their rate of success was 100%. The remaining patients showed improvement from 73% to 95 (table 2). Three patients discontinued treatment for reasons not related to the treatment. One patient, age 69, with 4 months duration and claudication distance of 240 meters showed no improvement after receiving 7 courses of treatment. The mean rate of success was 87.2%.

Discussion

It was not easy to discuss the treatment of arteriosclerosis and only in the last 20 years have advancements been made. Although physical therapy is only part of the total management of arteriosclerosis of the lower limbs, it could play an important role in the management. No references were found in literature concentrating the use of low level laser therapy in the management of arteriosclerosis. This work has shown that low level laser therapy is capable of increasing the circulation in muscles and, with prolonged treatment, a considerable significant improvement in circulation can be achieved in cases of arteriosclerosis. Low level laser therapy not only influences the superficial circulation but also deep circulation. The mechanism of this action is probably due to the sympathetic effect, but it could also be used on the action of normal skin excitation. It can be assumed that apart from the increase in the pain threshold (Nikolova, 1968) and muscular excitation threshold, there is also an increase in the threshold for sympathetic stimulation (Pabst, 1960). By this paravertebral application, we must concede more importance to the sympathetic action, than to the direct action on the vasometer assumed by some authors (Monode, 1951; Zinn, 1956). The results obtained in the treatment of arteriosclerosis by means of

low level laser therapy are certainly based on a number of different effects. First, there is sympathetic action. Also, the analgesic action of this type of current deserves special attention, since it is the cause of the subjective improvement which frequently precedes the objective improvement in cases of sever arteriosclerosis when pain is felt while resting. Also, rest pain did not mean the presence of irreversible pathologic change as the three patients with rest pain showed a good degree of improvement. The patient who showed no improvement after 7 courses of treatment may have an irreversible pathologic change and, this age of 69 years may have also contributed to the failure of treatment.

Conclusion

Low level laser therapy may be considered in the treatment of peripheral arteriosclerosis.

Table 1 - Clinical data and claudication distance

No	age	sex	Duration of pain in months	Claudication distance in meters
1.	45	Male	7	250
2.	50	Male	6	300
3.	49	Male	4	Rest pain
4.	55	Female	3	360
5.	54	Male	4	380
6.	60	Male	6	200
7.	58	Male	8	320
8.	69	Male	4	240
9.	63	Male	3	Rest pain
10.	60	Male	4	350
11.	62	Male	3	380
12.	59	Male	4	400
13.	58	Female	5	450
14.	56	Female	6	500
15.	60	Male	7	300
16.	55	Male	2	250
17.	54	Male	1	Rest pain
18.	60	Female	3	350
19.	64	Male	2	300
20.	58	Male	5	260

Table 2 - Claudication distance in metres before treatment and the distance walked without experiencing pain after treatment.

No	Distance before treatment	Distance after treatment	Improvement
1.	250	1300	84%
2.	300	1450	85.8%
3.	Rest pain	1100	73.3%
4.	360	1500	100%
5.	380	1500	100%
6.	200	Discontinued	-
7.	320	1350	87.2%

8.	240	No improvement	0%
9.	Rest pain	1200	80%
10.	350	Discontinued	-
11.	380	1500	100%
12.	400	1500	100%
13.	450	1500	100%
14.	500	1500	100%
15.	300	1500	100%
16.	250	1350	88%
17.	Rest pain	1250	83.3%
18.	350	1500	100%
19.	300	1400	91.6%
20.	260	Discontinued	-

Vopr Kurortol Fizioter Lech Fiz Kult. 2001 May-Jun;(3):5-7.

[Supravascular laser exposure in combined modality treatment of patients with arteriosclerosis obliterans of blood vessels of lower extremities]

[Article in Russian]

Leont'eva NV, Evdokimova TA, Sedletskaia Elu, Dmitrieva IaV, Zolotnitskaia VP.

The efficiency of supravascular laser exposure in multiple-modality treatment of patients with atherosclerosis obliterans with distal vascular lesions is demonstrated and the method of noninvasive laser exposure of the lower limbs is validated. Difficulties in the treatment of this category of patients prompted supplementing traditional therapy by supravascular laser exposure in 32 patients. No laser therapy was used in the controls.

Khirurgiia (Mosk). 2003;(4):14-9.

[Low-intensive laser irradiation in combined treatment of lower limbs atherosclerotic lesions]

[Article in Russian]

Lipatova IO, Arslanova VM, Kriuchkov VI, Markov AN, Sakharov AB.

Seventy-one subjects entered this study. The control group consisted of 12 healthy subjects, the comparative group included 15 patients who received standard therapy of vascular diseases but without physiotherapy. The study group consisted of 44 patients whose treatment was supplemented with laser irradiation. Angiography, ultrasonic dopplerography, laser flowmetry, oxygenometry were applied for control of treatment

efficacy. Regional ischemia was evaluated with detection of pO₂ of foot. LT increased oxygenation of foot soft tissues in patients with low primary pO₂ and decreased in ones with higher. As a result the number of patients with low pO₂ ($0 < pO_2 < 20$) decreased from 13.7 to 4.5%, with middle pO₂ ($20 < pO_2 < 40$) increased from 27.3 to 50.0%, with high pO₂ ($pO_2 = 40$) decreased from 59.0 to 45.5%. Redistribution in favor of $20 < pO_2 < 40$ is regarded as normalizing effect of LT. It is concluded that LT increases oxygenation of foot soft tissues in patients with low primary pO₂ and decreased in ones with higher.

Lik Sprava. 2002;(8):98-102.

[Low intensity laser radiation in complex therapy of patients with vascular obliterating atherosclerosis of low extremities]

[Article in Russian]

Klimenko IT, Shuvalova IN.

It is shown that laser therapy used in a multiple-modality treatment of patients with obliterating atherosclerosis of vessels of the interior limbs presenting with stage I-III ischemia permits achieving a substantial clinical effect manifested subjectively by fewer compliants or disappearance thereof in a proportion of patients, which fact is corroborated by objective findings such as increase in peripheral, volumetric blood flow and lower degree, in some patients, of ischemia of the extremities, improvement in processes of microcirculation and hemocoagulation. The use of laser radiation and pneumocompression combined in treatment of patients with chronic arterial insufficiency of the lower extremities of atherosclerotic genesis has been shown to have a more marked and appreciable effect. The studies made broaden our possibilities of conservative non-medicamentous treatment of obliterating atherosclerosis of vessels of the lower extremities.

Vopr Kurortol Fizioter Lech Fiz Kult. 1998 Jul-Aug;(4):31-6.

[The combined action of infrared radiation and permanent and alternating magnetic fields in experimental atherosclerosis]

[Article in Russian]

[Zubkova SM](#), [Varakina NI](#), [Mikhailik LV](#), [Bobkova AS](#), [Maksimov EB](#).

Paravertebral exposure to infrared radiation (0.87 micron, 5 mW) and permanent magnetic field in combination with one- and two-semiperiodic alternative magnetic fields (50 Hz, 15-30 mT) was studied in respect to the action on adaptive reactions in animals with experimental atherosclerosis. Complex consisting of infrared radiation, permanent magnetic field and one-semiperiodic pulse alternative magnetic field was most effective in restoration of vasomotor-metabolic and immune disturbances accompanying development of atherosclerosis.

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.

[Low intensity laser irradiation in therapy of elderly patients with occlusive artery diseases]

[Article in Russian]

Korkushko AO, Chupryna GN.

Shown in the paper is a novel complex approach to the treatment of occlusion affections of arteries by He-Ne and infrared laseropuncture. As many as 80 patients having a history of the above health problem 5 years in duration were kept under medical supervision. Patient age ranged between 50 to 78 years. Laseropuncture was carried out with the aid of the infrared laser stimulator [symbol: see text]-001 (wavelength 0.89 mm with continuous-wave pulse operation, pulse power 8 W) and 111 He-Ne laser (wavelength 0.63 mm, power density 5 mW/cm², spot diameter 25 mm). 88.2 percent of patients derived apparent therapeutic benefit, 11.8 percent demonstrating a satisfactory clinical effect.

Sov Med. 1990;(3):21-3.

[Intravenous laser irradiation of the blood in occlusive vascular diseases of the extremities]

[Article in Russian]

[Shval'b PG](#), [Zakharchenko A Ia](#), [Sigaev AA](#), [Kataev MI](#).

The authors analyze the results of clinical application of intravenous He-Ne laser irradiation of the blood in patients with obliterating diseases of the limb vessels. Starting from 1984, this method was employed in the treatment of 133 patients, of these 102 ones with atherosclerosis obliterans of the lower limb vessels, 17 with endarteritis obliterans, and 14 with Raynaud's syndrome. Intravenous laser therapy proved to be the most effective in atherosclerotic involvement of the vessels, when positive result was achieved in 77.5 percent of patients. The length of remission was up to 6 months. The method of treatment is described.

Circulation. 1992 Feb;85(2):756-68.

Percutaneous delivery of low-level laser energy reverses histamine-induced spasm in atherosclerotic Yucatan microswine.

Gal D, Chokshi SK, Mosseri M, Clarke RH, Isner JM.

Tufts University School of Medicine, Department of Biomedical Research, St. Elizabeth's Hospital, Boston, Mass. 02135.

BACKGROUND. Previous in vitro experiments performed in our laboratory have shown that low-level laser energy may produce prompt reduction in isometric tension of vascular smooth muscle. The present study was designed to extend these previous in vitro findings to an in vivo model and thereby investigate the hypothesis that laser light delivered percutaneously in vivo could successfully reverse arterial spasm. **METHODS AND RESULTS.** Spasm defined as greater than 50% reversible reduction in luminal diameter persisting for greater than or equal to 5 minutes was successfully provoked by injection of histamine (100-400 micrograms/kg) in 13 arteries among 10 atherosclerotic Yucatan microswine; the magnitude of histamine-induced vasoconstriction was then documented angiographically by repeated injections of contrast media for as long as 30 minutes (controls). After return of angiographic luminal diameter to baseline, spasm was reproduced with a second injection of histamine into the same artery. Representative wavelengths generated by ultraviolet (UV), visible, and infrared lasers were then delivered percutaneously via conventional fiberoptics to the site of spasm, and angiographic assessment was repeated for as long as 30 minutes (treatment trial). In three arteries treated with UV (351 nm) light from an excimer laser, angiographic luminal diameter narrowing decreased from 100% to 23.9%, 50.0% to 9.3%, and 76.0% to 42.3%, respectively. The magnitude of laser-induced increase in luminal diameter was 50.2 +/- 22.7%, which was significantly greater than the magnitude of relaxation observed spontaneously during the control trials (10.9 +/- 9.8%, $p = 0.02$). Visible light from a helium-neon (632 nm) laser accomplished complete reversal of histamine-induced spasm in two of four arteries; in the remaining two arteries, luminal diameter narrowing percentages were reduced from 57.0% to 20.0% and from 76.5% to 30.8%, respectively. The magnitude of helium-neon laser-induced relaxation (55.8 +/- 17.9%) was again significantly greater than that observed during the control trials (0.9 +/- 1.9%, $p = 0.01$). Finally, infrared irradiation from a diode-pumped neodymium:yttrium aluminum garnet (1,064 nm) laser decreased histamine-induced luminal diameter narrowing in three arteries from 100% to 21.4%, 56.0% to 8.7%, and 68.3% to 35.3%, respectively. The magnitude of infrared laser-induced improvement in luminal diameter narrowing was 53.0 +/- 23.3%, which was significantly greater than that observed during the control trials (12.9 +/- 10.7%, $p = 0.01$). In three additional arteries, fiberoptic sham trials (without laser irradiation) failed to produce relaxation of histamine-induced spasm. **CONCLUSIONS.** These findings document for the first time that light-induced relaxation of vascular smooth muscle, previously documented in vitro, may be reproduced in vivo.

