

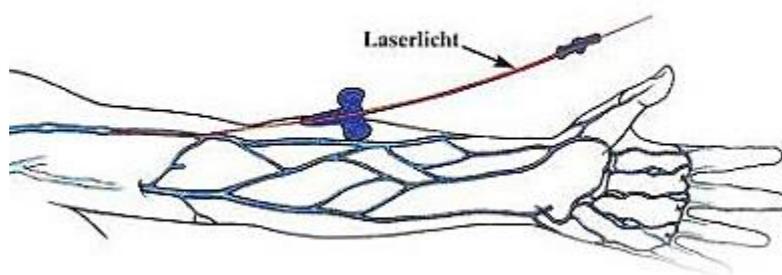
Laser Blood Therapy

The Principle

The importance of lasers in medicine is being increasingly recognized as there are hundreds of research papers published each year. In addition to the well known use of lasers for surgical purposes (hard laser) the soft laser is being seen as of equal importance. The introduction of our modern multi-channel laser systems (up to 12 independently programmable lasers) in 2001 caused a revolution in the medical laser therapy, also the highly focused laser (Laser needles) provide a large increase in penetration depths and furthermore through a combination of different laser wavelengths (red, infrared, green and blue laser) reparative effects of a great variety can be achieved in the tissue. Weber Medical is committed to research and technical development of the laser and as a result it can now also be applied directly within damaged tissue, to specifically allow the treatment of normally highly treatment-resistant symptoms, this is a much more effective treatment option for conditions like spinal injury, herniated discs, joint arthrosis, etc. The use of our intravenous laser therapy device (Laser treatment of blood) leads to a general energizing, immune enhancing and metabolic optimization and thus offers a very successful way to treat a variety of intractable diseases. The clinical effects are well documented in many studies and as a result Weber Medical now has sold over 800 devices in 30 countries.

Intravenous Laser Therapy

Studies show stabilization and energizing effects and improvement of laboratory values and many other positive effects on often intractable diseases. Intravascular laser blood irradiation was performed for the first time about 25 years ago in the former Soviet Union. Laser light was introduced directly into the flowing blood. Previously, in-vitro studies have shown that biological Soft laser irradiation of white blood cells trigger a variety of positive effects, in particular expression of immunoglobulins, interferons and interleukins, which are of particular importance. After introduction of the process, numerous studies were published that showed additional effects on various metabolic processes.



Bei der intravenösen
Laserbehandlung wird ein
Lichtleiter (Quarzfaser)
in die Ellenbogenvene
eingeführt.

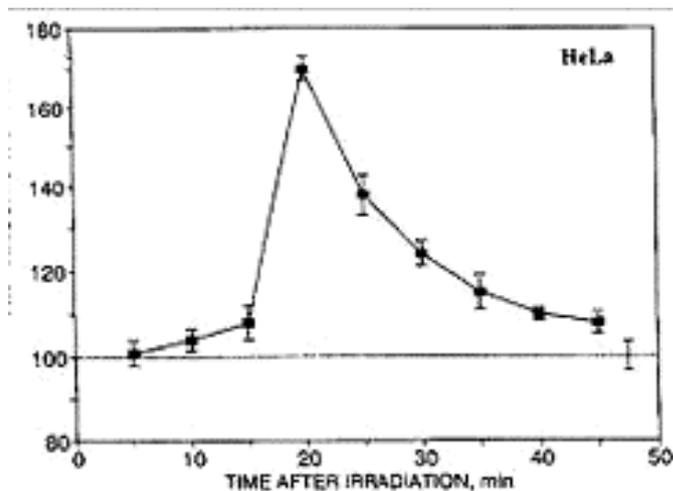
Our Laser Blood Therapy (LBT) achieved approval for its intravascular laser blood irradiation apparatus in 2005 this was in part funded by a program titled Biophotonics II of the state government of Lower Saxony. Following this LBT treatment was used in Germany for the first time on patients in clinical trials. In our own studies, the results from the predominantly Russian literature are largely confirmed. We found in almost all patients a general stabilizing and energizing as well as many other positive effects in conditions like chronic liver diseases, diabetes mellitus, lipid disorders, and various other diseases. This opens new therapy options in the treatment of systemic disorders of the metabolism and immune system.

General Effects

1. Significant improvement in overall performance
2. Improvement in sleep and vigilance
3. Positive effect on the general mood
4. Reduction of drug consumption

Special Effects

- Optimization of the diabetic metabolic state
- stat incomparable influence of hypercholesterolemia
- significant reduction of pathologically elevated liver values
- Reduction in frequency of relapses in chronic inflammatory bowel disease
- Improvement in general health status and mobility in MS disease
- positive influence on intractable pain syndromes
- positive influence of tinnitus
- Reduction of antihypertensive medication for severe hypertension
- positive influence of maculopathy



Increase of ATP with laser irradiation (632 nm) of HeLa-cell culture

Areas of application:

- Diabetes mellitus
- Chronic liver and kidney diseases
- Dyslipidemia



- Cancer diseases
- Heart diseases
- Chronic pain syndromes
- Allergies and eczema
- Performance enhancement in sport
- Polyneuropathies
- Fibromyalgia
- Rheumatism
- Hypertension
- Tinnitus
- Macular Degeneration
- Multiple Sclerosis
- Depression
- Burn-out syndrome
- CFS (chronic fatigue syndrome)
- Lyme disease

Cellular effects of intravenous laser light irradiation

A) Cellular reactions after absorption of light

1. In the first step we find a change of the redox potential and an acceleration of the electron transport
2. NO is released from the catalytic center of the cytochrome-c-oxidase (NO-Hypothesis)
3. There is a production of superoxide anions (superoxide-anion-hypothesis)
4. in a photodynamic reaction singlet oxygen is generated
5. there is an increased biochemical activity by local heating of the photo acceptors (transient heating hypothesis)

B) In principle:

- Proliferation on immune cells leads to the combat of inflammations and an accelerated healing of wound as well as an increased endorphin disbursement, increase of the ATP production and increased nervous cell potential.
- Increased leukocyte phagocytosis, boosted neovascularization, increased collagen formation and protein biosynthesis. It also leads to an improved cell respiration and stabilization of the membrane potential.
- Enhancement of the proton gradient via the mitochondria membrane, generation of an increased potential difference with increased phosphorylation of ATP (increase of 150%).
- No modification of intact cells.
- Energetic build-up of sick cells.
- Energy is to a large extent (more than 40%) used for ATP synthesis, in order to increase the pump activity for maintaining the membrane potential.
- Membrane stabilization leads to blocking of impulses, reducing the transmissions of pain sensations.
- The cell's calcium content is regulated (diminished ATP synthesis leads to an overflow of the cell with calcium and activation of proteinases, resulting in the death of the cell, the necrosis).

- In the pre-necrotic state, cells suffer from acute lack of energy with sodium and calcium streaming in, which can only be removed with the utmost pump activity. This pump activity can only be enhanced by radiant energy.

The current existing standards:

Red laser

- Stimulation of the immune system,
- Increase ATP;
- stimulate the end-complex cytochrome-c-oxidase
- high Enhancement of (blood) microcirculation
- photosensitizing effects on Chlorines and Haematoporphyrins

Green laser

- Increased oxygen supply,
- stimulation of the mitochondrion,
- high Enhancement of (blood) microcirculation
- Strong anti-depressive effects

Red + Green

Stimulation of blood building system, enhancement of red blood cells

Blue laser:

- Increased NO,
- anti-bactericidal effects;
- stimulate the starter complex NADH dehydrogenase
- photosensitizing effects on Curcumin

Yellow laser:

- Detoxification,
- Medium anti-depressive effect,
- photosensitizing effects on Hypericin
- (in combination with Hypericin) also strong anti-bactericidal, anti-viral and anti-fungal effects

Some more details about the different colors

Blue/red light treatment

It was found that some of the visible violet light, present in sunlight, in the range 405-420nm activates a porphyrin (Coproporphyrin III) in *Propionibacterium acnes* which damages and ultimately kills the bacteria by releasing singlet oxygen. A total of 320J/cm² of light within this range renders the bacteria non viable. This part of the spectrum is just outside the ultraviolet and produces little if any tanning or sunburn.

Application of the light for 3 consecutive days has been shown to reduce the bacteria in the pores by 99.9%. Since there are few porphyrins naturally found in the skin, the treatment is believed safe except in patients with porphyria; although eye protection is necessary due to light sensitive chemicals in the retina. The light is usually created by fluorescent lamps, bright LEDs or dichroic filament bulbs.

Treatment is often accompanied with application of red light which has been shown to activate ATP in human skin cells (essentially a photobiomodulation effect), and seems to improve response rates. Overall improvements of on average 76% for 80% of patients occurs over 3 months; most studies show that it performs better than Benzoyl peroxide but treatment is far better tolerated. However, approximately 10% of users see no improvement.

Blue light therapy

Recently, the Journal of Neuroscience reported that this specific bandwidth of light is up to five times more effective than other wavelengths at causing this neurochemical shift. A joint National Institute of Health (NIH) study with Thomas Jefferson University was also conducted to determine the antidepressant response of blue light therapy. This study demonstrated recovery and remission rates equal to or higher than similar studies with standard bright light therapy.

Blue Light therapy for Circadian Rhythm Disorder

Blue light therapy is a valid treatment for CRD, confirmed by years of study by research centers around the world. Scientists are just beginning to learn about the connection between CRD and many types of mental and physical illnesses. Fatigue, irritability, lethargy and a lack of enthusiasm, depression, feeling unhappy and unusually tired, are just some of the ways our body can react to CRD. People that suffer from Bi-Polar disorder, PMS, sleep disorders, SAD, and even Alzheimer's patients, may benefit from professionally administered light therapy

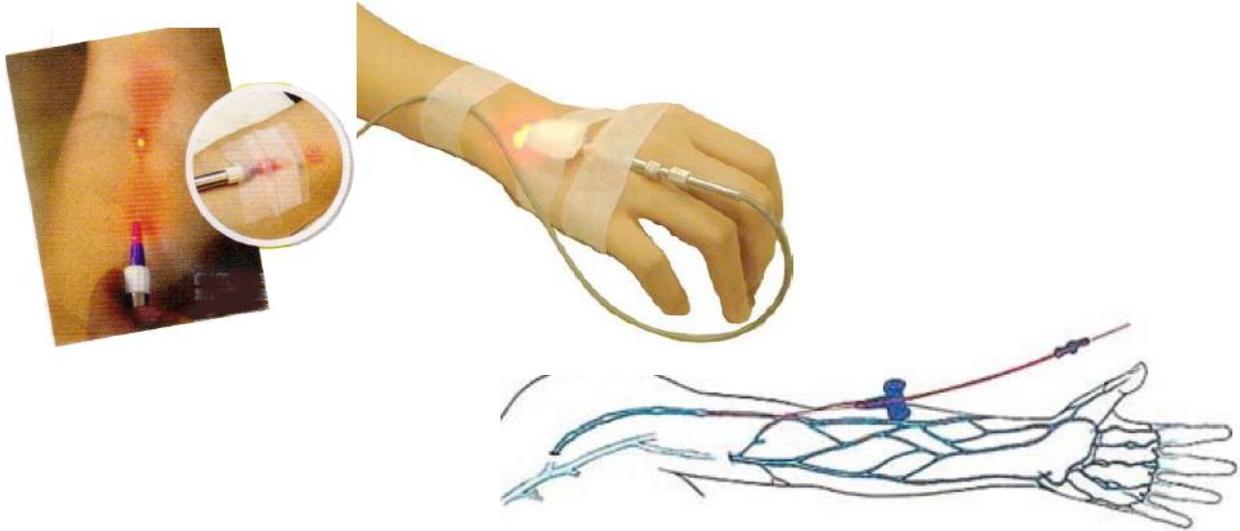
BRIO Clinic offers

- A) For Cancer patients the Photodynamic Laser Therapy
 - 1. Curcumin plus IV-Blue-Laser
 - 2. Hypericin plus IV-Yellow Laser
 - 3. Taloporphin plus IV-Red Laser with parallel Epicutaneous Red-Laser

- B) For many kinds of chronic disorders and Anti-Aging treatments:
 - a) a combination of red, green and blue laser (each color minimum 20 minutes);
 - b) to increase the effects parallel (at the same time) with special infusion cocktail (SUPPORTIVE INFUSION THERAPY A or B);
 - c) to receive the highest effect:
 - simultaneous
 - IV-Laser, 3 colors
 - Supportive Infusion A/B
 - Systemic Hyperthermia (45-60min)

Some details about Laser Blood Irradiation (LBI)

Photohemotherapy (therapy method by light irradiation of blood) is a group of quite effective methods of light therapy. It can be classified by physical parameters of light used for irradiation (red or infrared laser light, blue light, ultraviolet and yellow light), by the way of irradiation (direct irradiation of blood inside of a vein intravenous, inside of artery intra-arterial, extracorporeal in plastic or quartz irradiation chamber as well as indirect epicutaneous irradiation).



There are several reports about positive outcomes of irradiation of blood with laser light for the therapy of different pathologies. Red laser light is usually applied for blood irradiation. Invasive and non-invasive methods of blood irradiation exist. Intravenous and extracorporeal blood irradiation are examples of invasive blood irradiation, while epicutaneous blood irradiation is an example of non-invasive methods. Red LED light can also be used for blood irradiation.

It was shown, that IV HeNe (red) LBI stimulates the immune response of the organism, activates erythropoiesis and improves deformability of erythrocyte membranes, has anti-hypoxic activity on tissues and general antitoxic influence on the organism at different pathological processes. IV LBI is used for its biostimulative, analgetic, antiallergic, immunocorrective, antitoxic, vasodilative, antiarrhythmic, antibacterial, antihypoxic, spasmolytic, anti-inflammatory and some other properties. IV LBI activates nonspecific mechanisms of anti-infectious immunity. Intensifying of bactericidal activity of serum of the blood and system of the complement, reduction of the degree of C - reactive protein, level of middle molecules and toxicity of plasma, increasing the content of IgA, IgM and IgG in the serum of the blood, as well as decreasing of the level of circulating immune complexes are proved. There are studies on boosting effect of IV LBI on the cellular immunity (N. F. Gamaleyeva et al., 1991). Under influence of IV LBI the phagocytic activity of macrophages increases, concentration of microbes in exudate in the abdominal cavity of patients with peritonitis decreases, reduction of inflammatory exhibiting of disease, activation of microcirculation are detected.

The immunological effect of IV LBI can be explained by normalization of intercellular relationships within the subpopulation of T-lymphocytes and increasing the amount of immune cells in a blood. It increases the function activity of B-lymphocytes, strengthens the immune response, reduces the degree of intoxication and as a result improves the general condition of patients (V. S. Sergievskiy et al., 1991).

IV LBI promotes improving the rheological properties of blood, rising fluidity and activating transport functions. That is accompanied by increasing the oxygen level, as well as decreasing the carbon dioxide partial pressure. The arterio-venous difference by oxygen is enlarged, that testifies the liquidation of a tissue hypoxia and enrichment the oxygenation. It is a sign of normalization of tissue metabolism. Probably, the basis of activation of oxygen transport function of IV LBI is the influence on hemoglobin with transforming it in more favorable conformation state. The augmentation of oxygen level improves metabolism of the organism tissues. In addition, the laser irradiation activates the ATP synthesis and energy formation in cells (A. S. Krjuk et al., 1986). Application of IV LBI in a cardiology

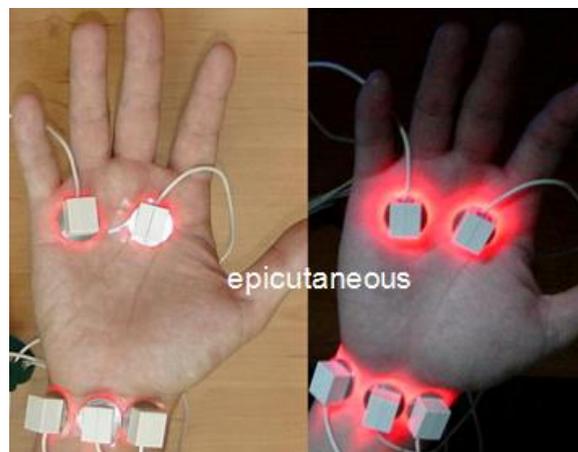
has shown that procedures have analgetic effect, show reliable rising tolerance of patients towards physical tolerance test, elongation of the period of remission.

It was proved that IV LBI reduces aggregation ability of thrombocytes, activates fibrinolysis, which results in peripheral blood flow velocity increasing and tissues oxygenation enriching. The improvement of microcirculation and utilization of oxygen in tissues as a result of IV LBI is intimately linked with positive influence on metabolism: higher level of oxidation of energy-carrying molecules of glucose, pyruvate, and other substances.

After IV LBI vasodilation and change in rheological properties of blood are revealed. IV LBI can also unblock the capillaries and collaterals, which then can improve supply of nutrients to tissue and improve the nerve cells function (N. N. Kapshidze et al., 1993).

IV LBI can increase the concentration of antibiotics and some other medications in the pocus of inflammation. It is known, that due to local edema blood circulation can be seriously disrupted in the areas of inflammation; for example, in kidneys. It was shown, that the concentration of antibiotics in healthy kidney is about 10 times higher, than in the inflamed kidney. Laser irradiation helps to increase concentration of the antibiotics in target areas. Similar studies showing favorable effect of blood irradiation for increasing concentration of administered antibiotics in inflamed prostate gland. Activation of microcirculation is one of the most pronounced effects of IV LBI. The improvement of microcirculation after IV LBI was detected in all structures of the central nervous system. This effect was the strongest in the highly developed vascular system hypothalamus. The capillaries of the hypothalamus are remarkable for high permeability for macro-molecular proteins. That can further amplify influence of the irradiated blood to subthalamic nuclei. It is assumed, that IV LBI can increase the functional activity of hypothalamus and all limbic system, which then can cause the activation of energetic, metabolism, immune and vegetative responses, mobilization of adaptive reserves of the organism.

In addition to the invasive method of intravenous laser blood irradiation (IV LBI) non-invasive **Epicutaneous Laser Blood Irradiation (ELBI)** is also available.



This non-invasive and relatively simple method of blood irradiation has been taken into use only after development of bright enough red and infrared lasers. It was shown that infrared radiation can go deep enough to reach vessels and irradiate blood. In addition, red laser light can also influence blood in superficial veins. Currently semiconductor laser diodes with red (630-670 nm) or near infrared (800-1300 nm) light emission are used to perform ELBI therapy.

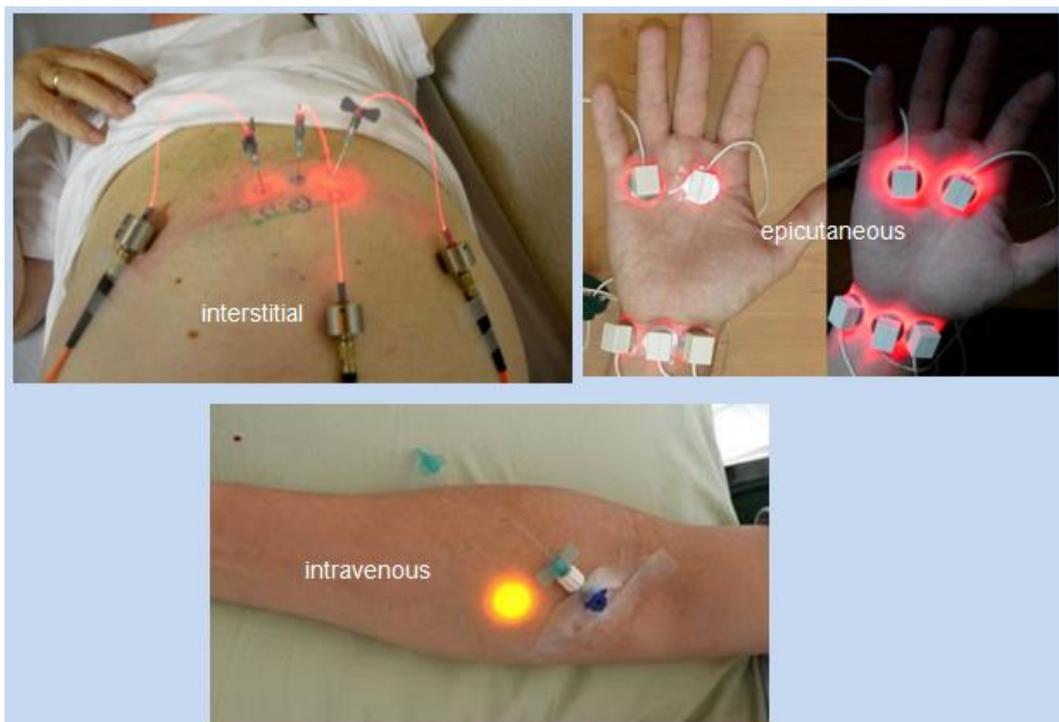
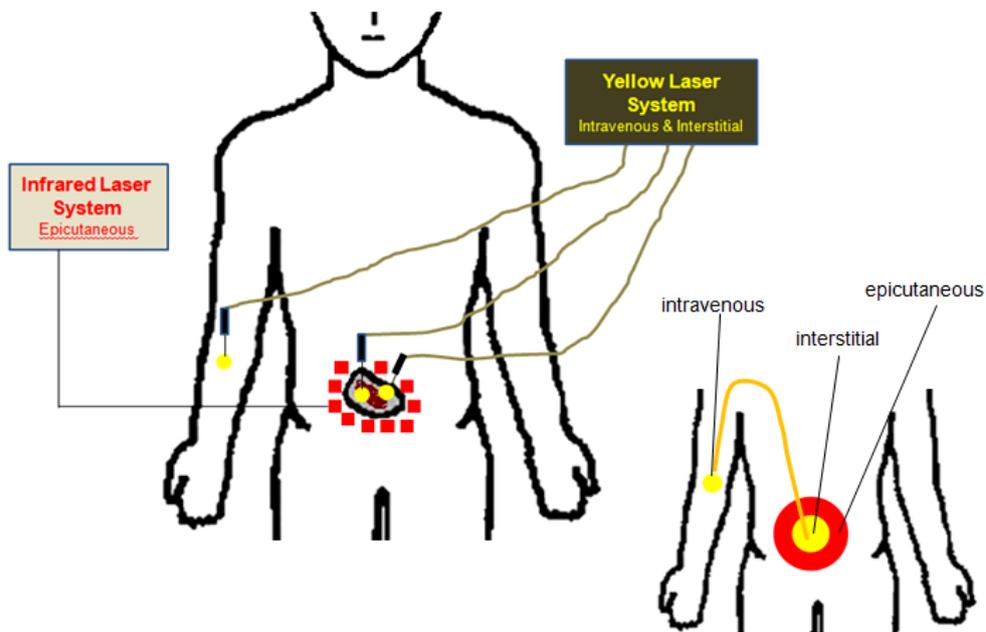
Recent studies suggested that the medical effects of ELBI are similar or very close to the effects of IV LBI. It is believed, that the treatment results of 20 mW red laser epicutaneous blood irradiation are similar to 1 mW red laser intravenous blood irradiation. Laser light is delivered to the skin in the area of a large vein or artery through a special light-guide. Contact of the light-guide with the skin with some pressure can increase penetration of the light.

The biggest advantage of ELBI is that this method of blood irradiation is painless. Another important issue is that the need for intravenous injection is completely eliminated. This is why ELBI has the

greatest advantage for the treatment of children or patients with bad vessel conditions (small or difficult to find deep veins).

Unfortunately, not enough research exists to date directly comparing medical and biological effects of IV and epicutaneous LBI with each other. G. Brill (1994) suggested that the effects of the laser therapy depend on the method of irradiation. He considered that the term «epicutaneous laser blood irradiation» is not quite correct, because it mentions only irradiation of blood and hides the irradiation of other nearby tissues, including all layers of skin, possibly acupuncture points, nerves, lymphatic glands and vessel, and even muscle and bone tissues. In case of IV LBI the main portion of the laser light is absorbed by blood, while in case of ELBI only minor part can reach blood. So, it is better not only to mention ELBI, but also to specify the exact area of irradiation.

Working Principle of simultane interstitial, intravenous and epicutaneous PDLT



Low level laser blood irradiation (LBI) is one of the most perspective methods of low level laser therapy. LBI is used in the therapy of several disorders. LBI had several positive effects, such as antiinflammatory effect, activation of immune system, protection of vessels, improvement of blood microcirculation and tissue trophic processes, activation of regeneration and reparation. Better state of vascular wall, atherosclerotic plaque size reduction, improvement in blood microcirculation was observed among patients with atherosclerotic vascular disease after epicutaneous infrared (IR) LBI.

Some scientists considered as a key importance problem determination the most appropriate methods of applying laser energy, dosage. In the same time some Russian scientists (Karu, Drill, and Klebanov) considered as the most important factor the wavelength of light and main photo-acceptor molecule or structure. They argued that laser light and non-coherent light of same wavelength and power density have the same biological and medical effects.

It was shown that different spectra light have approximately the same influence on then organism. For example, Samojlova (1998) compared results of photo-modification of blood under HeNe intravenous and UV extra-corporate irradiation. She reported that changes in blood cells after UV irradiation were very close but not completely similar to changes discovered after HeNe blood irradiation. Other scientists reported that the clinical effects of HeNe and IR laser irradiation are also the some. Kapustina (1997) reported that 3 main groups of patients according to the response to LBI were detected. The first group patients had immediate in vitro (within 15 min.) positive changes in the state of erythrocyte membranes under LBI, the second group patients had postponed response, and the third group patients had no response at all. Clinical (in vivo) studies proved, that the first group patients showed better and faster treatment results. For the second group patients more sessions of LBI were required to achieve therapeutic results. No therapeutic effects were discovered for group 3 patients.

Several studies emphasized that laser effects were detected in the case of irradiation of damaged cells and organisms. In the case of irradiation of normal and healthy organisms very slight or no changes at all were registered.

The influence of low level laser irradiation on the organism has several clinical effects, including anti-inflammatory, immune stimulating, neurotrophic, analgesic, desensitizing, bactericidal, antiedemic, normalizing the blood rheology and hemodynamics effects. So the areas of application of LLLT are very large and include almost all branches of medicine:

- Cardiology - ischemic heart disease, stenocardia, myocardial infarction;
- Oncology – Photodynamic Laser Therapy (incl. Photosensitizer)
- Otorhinolaryngology - pharyngitis, tonsillitis, maxillary sinusitis, tracheitis, otitis;
- Gastroenterology - gastritis, stomach ulcer and duodenal ulcer, cholecystitis, pancreatitis, hepatitis, colitis;
- Dermatology - dermatitis, dermatosis, neurodermite;
- Pulmonary diseases - bronchial asthma, pneumonia, pleuritis;
- Gynecology - mastitis, inflammations, erosions, generic and postnatal complications;
- Urology - adenoma, prostatitis, cystitis, urethritis, nephritis, pyelonephritis, urolithic disease;
- Proctology - hemorrhoids, periproctitis, anal pruritus and fissures;
- Neuropathology - neuritis of upper and lower extremities, radiculitis, neuralgia of the head and face;
- Arthrology - diseases of joints and vertebral column;
- Stomatology - caries, pulpitis, periodontitis, paradontitis.

In the near future more studies about the influence of different wavelength laser light on the organism, the most appropriate dosage of laser irradiation would be done. As a result probably the mechanisms of laser therapy would be more understandable than, as well as the methods of forecasting the clinical effects of laser irradiation would be developed.