

## **Low-intensity laser radiation in preoperative preparation of patients with benign prostatic hyperplasia**

[Article in Russian]

Neimark AI, Muzalevskaia NI.

Low-intensity laser therapy administered in the form of intravenous blood irradiation, transrectal and transurethral prostatic irradiation and their combination as preoperative preparation and correction of immunity disturbances in patients with benign prostatic hyperplasia (BPH) were studied. The response to the treatment was evaluated by positive changes in the immune status and bacterial contamination of the urine and prostatic tissue. Conventional preoperative preparation (uroantiseptics, antibiotics and phytotherapy) fails to correct signs of T-cell immunodeficiency, depression of phagocytic activity of neutrophils, significantly reduce bacteriurea. Laser therapy as intravenous laser blood radiation acts immunomodulatorily on cellular immunity and normalized the proportion of T-helpers of the first and second order (T-suppressors) and neutrophil phagocytosis. The antibacterial effect of this technique on urinary microflora and prostatic tissue is not very high. Local laser therapy is a potent immunostimulator of T- and B-lymphocytes, increased the index of immunoregulatory cells' proportion, activated phagocytosis of neutrophils. It has pronounced antibacterial effect against gram-negative urinary microflora and tissue of the prostate. Combined laser therapy produced the highest immunomodulating action on T-lymphocytes and immunostimulating one on B-lymphocytes, potentiated phagocytic ability of neutrophils, elevated index of the immunoregulatory cells, but was unable to correct their imbalance completely. Antibacterial effects of combined laser therapy were the highest, including the bacterial group *Proteus-Providencia*. Preoperative low-intensity laser therapy of BPH reduced the number of postoperative pyoinflammatory complications, hospital stay, severity of postoperative period.

## **SEMICONDUCTOR LASER RAYS THERAPY FOR THE TREATMENT OF CHRONIC PROSTATITIS**

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**Introduction:** Chronic prostatitis (ACP) hasn't a universally successful therapy yet. A lot of studies demonstrated that LASER therapy has an anti-inflammatory effect on tissues and can increase lymphatic and venous drainage reducing inflammatory swelling. For this reasons in the early 90s we proposed a new therapeutic system for ACP using semiconductor LASER rays consisting of a gallium-arsenide diode. At the beginning an endorectal probe was used; then we invented a particular endourethral probe for laser therapy. This is a brief abstract of what we achieved during these years.

**Histological preliminary studies:** Many authors studied biological effects of LASER on animal tissues (1). Before clinical practice LASER therapy was tested on a cancer cell line (SW 626) in order to evaluate if laser stimulation could increase mitosis cell rate (2) and therefore have a carcinogenic-like effect. We didn't observe any change in mitosis cell rate. Another study (3) was made on rabbits to test in vivo any immediate histopathological damages and temperature rising in rectal ampulla using transrectal probe. Temperature rising was about 2/10th of a degree centigrade. No histopathological alterations of rectal wall and the prostate were observed with particular care of signs of swelling, flogosis or fibrosis.

**Materials and methods:** The gallium-arsenide diode in use has a wave length of 904 nm and a frequency of 3000 Hz. The Laser beam reaches the prostate with a special optic probe. This is divided in two sections: one contains the laser generator, the other has five optic fibers and it is screwed onto the first creating a single body of reduced dimensions. It can be sterilized and it is atoxic. We experimented 2 different approaches to the prostate: the first was an endorectal approach and the second was an endourethral approach. At the beginning we used a "Laser Super Sonic" machine with endorectal probe according to Strada. The treatment schedule was 1 treatment every two days (treatment's time of 12 minutes, wave length 3000

Hz)) for a total of 12 applications. Transrectal laser therapy was not indicated in prostate larger than 4 cm because this is the maximum depth of the laser beam's efficacy. Then we experimented an urethral probe (Med 130 Lasotronic â Wave lenght 820 nm, power 30 mW) in order to reduce energy leakage and increase patient's tolerability. In this case patients underwent 1 treatment every 3 days for a total of 8 applications (treatment's time of 4 minutes). From 1990 to 1999 more than 200 patients underwent this kind of treatment. We published results in previous studies (4-5).

**Clinical results:** More than 65% of the patients obtained a symptoms' relief even at 6 months after treatment. We observed a decrease in IPSS score and an improvement in maximum and mean urinary flow rate. We analyzed spermatic fluid before and after treatment (6) and we found that there was an increase in total germinal cells count, improvement in motility and in morphology. Concentration of zinc, fructose and citric acid was higher after treatment (Zinc:9.5 mg% vs 5.5 mg%; Fructose: 64.5 mg% vs 58 mg%; Citric acid: 360 mg% vs 305 mg%). Prostate ultrasounds allowed to appreciate a consistent reduction of prostate volume (21.9 cc vs 29.9 cc), probably due to resolution of oedema. Conclusion: In our experience laser therapy for chronic prostatitis can be an effective treatment in improving symptoms and modifying clinical and sonographyc parameters.

### **Efficacy of low-intensity laser radiation and antibacterial therapy in the treatment of chronic prostatitis in the presence of sexually infections.**

[Article in Russian]

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We studied 94 patients with chronic prostatitis (CP) in combination with urogenital chlamydiasis. The patients were divided into three groups. Group 1 consisted of 32 patients with bacterial prostatitis and sexually transmitted infection (STI). They were treated with fromilid in a dose 500 mg twice a day. Group 2 (n = 27) received also low-intensity laser radiation (LILR) on the prostatic gland. Group 3 patients (n = 35) with abacterial prostatitis were given fromilid (500 mg twice a day). We studied prostatic hemodynamics with color doppler mapping. A specific feature of prostatic vascularisation in CP and STI versus healthy subjects is heterogeneous decline of vessels density in

ischemic zones with parallel decrease in these vessels diameter. A peripheral prostatic zone in CP patients with STI was characterized by lower vascularisation than central one. This deteriorates the course of the disease. The results of the study show that adjuvant LILR in CP patients with STI raises efficacy of therapy by 11%. Investigation of prostate vascularisation and hemodynamics of its vessels in CP patients with STI using transrectal ultrasonography and dopplerography provide detailed information about prostatic structure allowing for lesion zones. This facilitates choice of an optimal complex treatment with application of LELR in peripheral inflammation of the prostate.

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### **Treatment of erectile dysfunction in patients with chronic prostatitis using vibromagnetic lazer.**

[Article in Russian]

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#### **Abstract**

The study was aimed to evaluation of the effectiveness of vibromagnetic lazer therapy (VMLT) of erectile dysfunction (ED) in patients with chronic prostatitis (CP). The study included 40 patients with CP, aged 22 to 45 years. CP duration ranged from 6 months to 9 years, ED--from 6 months to 7 years. All the patients underwent a survey on "Chart of sexological examination of man" with the calculation of sex constitution index, an transrectal ultrasonography of prostate gland (PG), uroflowmetry, clinical and functional assessment of components of the copulatory interval, and assessment of blood plasma concentrations of peptide and steroid hormones. All patients underwent a psychotherapeutic correction of sexual disadaptation, sex therapy using Masters-Johnson, Kaplan, and Lo Piccolo methods, and VMLT using "Matrix-Urologist" device. The control group included 20 healthy men aged 22 to 45 years. All studies were performed Before and 30 days after the end of the last VMLT session. As a result of the treatment, integral IIEF indicators were normalized in 60% of patients, the volume of the prostate--in 70%, hemodynamics in the phase of relaxation and erection--in 70%, venous blood flow in the PG--in 70%, dorsal artery hemodynamics in the phase of relaxation and erection--in 60%, and penile hemodynamics--in 60% of patients. Voiding bladder function was optimized in 75% of patients. The functional activity of the pituitary-adrenal-testicular system returned to normal level in 60% of

patients. 1 year after treatment, sexual function was maintained at attained levels in 47.5% of patients. As a matter of findings, it was concluded that VMLT is high effective method of combined non-pharmacological correction of erectile dysfunction in CP patients with strong and medium sex constitution.

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## **COMPLEX LASER MEDICINE THERAPY OF BENIGN PROSTATIC HYPERPLASIA**

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Benign prostatic hyperplasia (BPH) is a common problem of aging men, affecting the majority of individuals aged 60 years and above. The expressed violations of urination accompanying BPH are largely explained by accompanying prostatitis too. So medicine treatment directed only on restoring of urination, infringed enlarged of prostate, is unsufficiently effective.

We have developed a technique of laser-medicine therapy of the patients with BPH, which successfully was tested in 23 patients. The essence of a technique consists in simultaneous assignment of selective alpha 1-blockers tamsulosin and of local low-level laser therapy. On a background of a daily reception of tocopherol influenced by infrared laser radiation with the density of  $6 \text{ mW/cm}^2$  on a perineum within 10 days, exposition – 10 min. A repeated rate – through 2-2,5 months.

Tamsulosin was taken in the usual dose – 0,4 mg per day. Simultaneous application of laser therapy and alpha-1-blocker tamsulosin achieved a relaxation of smooth muscles of prostate, removal of spasm, facilitation of outflow of a prostate secret and an inflammatory exudate, cupping of dysuria. The clinical observations, being available by us, have confirmed higher efficiency of an offered technique, than for want of use of monotherapy of tamsulosin.

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## **Low level laser therapy of male genital tract chronic inflammations.**

Gasparyan L et al.

Male genital tract chronic inflammations were treated by combinations of transdermal, transrectal (prostate gland) and intravenous HeNe laser irradiation. The energy of a 2 mW HeNe laser was applied via a light guide into a vein. The projections of the male genital organ and the inguinal areas were irradiated with a 890 nm 5W peak power cluster probe. For the transrectal prostate gland irradiation a 890 nm 15W peak power laser was used. 36 patients were given conventional medical therapy and another 36 were given LLLT in combination with medical therapy. Clinical and laboratory findings were statistically better in the LLLT group and relapse rate was lower. It is suggested that LLLT increases the local circulation and thus also improves the effect of antibiotics.

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## **LOW LEVEL LASER THERAPY OF MALE GENITAL TRACT CHRONIC INFLAMMATIONS.**

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### **INTRODUCTION**

The authors summarized their experience of treating patients with male genital tract chronic inflammations caused by sexually transmitted diseases (STD) (Chlamydial infection, Trichomoniasis, etc.) using low level laser therapy (LLLT). Evolution of antibiotic resistant strains, spreading of chronic latent infections complicated the treatment and required several courses of medicament therapy.

LLLT helps to overcome the problems. LLLT of such patients includes laser irradiation of blood, prostate gland and skin projections of male genitals. Laser irradiation activates immune system, increases the permeability of prostate gland tissues for antibiotics, has antiinflammatory, analgetic properties, activates spermatogenesis, activates local micro-circulation, and sex function.

The obtained results proved that the combination of LLLT with medicament therapy provides better and faster treatment results.

## REVIEW AND THEORY

The incidence of chronic and latent forms of STDs has risen recently despite advances in diagnosis and treatment. Changes in sexual behavior, imperfect and late diagnosis, lack of adequate laboratory facilities, poor cultural examinations, incomplete treatment as a result of usage of low quality and adulterated antibiotics, cases of non-professional and self-treatment, reinfection from infected, but not treated sex partners, evolution and spreading of antibiotic resistant strains complicated the treatment of STDs.

Several groups mentioned beneficial effects of LLLT in the treatment of male genital tract diseases. Sato et al. (1984) demonstrated that laser irradiation had potential to increase sperm motility in vitro. Therapeutic laser applied directly to testes at a dose of 1.3 J/cm<sup>2</sup> has been successfully used in treatment of infertility (Hasan et al. 1989). Using HeNe laser applied directly to the scrotum, Miroshnikov and Reznikov (1989) found an immediate reduction in the pain, swelling, pyrexia and other symptoms of acute epididimitis. LLLT also reduced the necessity for surgical interventions. This group also reported about positive effects of HeNe laser irradiation in treatment of chronic intractable urethritis. LLLT produced reduction in pain, improvement in microscopic investigations, especially as regards the number of leukocytes. Such studies reported no side effects or complications so dangers associated with laser irradiation of or near the gonads are minimal. Koultchavenia (1997) found higher concentration of antibiotics in kidneys and prostate gland after local laser irradiation. Some studies showed the increase of sensitivity of microorganisms towards antibiotics after laser irradiation (Gorochov 1991, Avdoshin 1992). Kartachov (1994) mentioned that when some patients with bacterial latent urethritis started LLLT, *Trichomonas vaginalis* was found out in cultural studies. So laser irradiation could act like provocative test and help to diagnose latent STDs more precisely.

Duplik (1993) introduced a parameter "Specific Power Density" (mW/cm<sup>3</sup>) connected with both power characteristics of laser and optical properties of irradiated blood. Ovsjannikov (1997) suggested that calculation of energy absorbed in joules per cubic cm (J/cm<sup>3</sup>) of target organ tissues was physically more correct, than calculation of energy density in J/cm<sup>2</sup> of irradiated skin.

The authors aimed to study the role and parameters of LLLT in the complex treatment of patients with male genital tract chronic intractable inflammations, caused by some STDs.

## **PROCEDURES**

78 patients aged from 21 to 54 suffering from male genital tract chronic inflammations (urethritis, prostatitis, vesiculitis, epididymo-orchitis) were divided to a medication therapy group (group I, 36 patients) and medication plus laser therapy group (group II, 42 patients). Subjective and objective methods of investigation were used to diagnose diseases and evaluate the treatment. Laboratory studies included microscopic and cultural examinations of specimens of urethral discharge, urine, prostatic fluid, sperm, blood, as well as ultrasound and other examinations. Provocative tests are used to make latent STDs diagnosis more reliable. Posttreatment cultures were studied to establish that the treatment was adequate.

Each patient of group II received 10-12 procedures of laser irradiation, including 3-4 LBI and 7-8 procedures of laser irradiation of skin projections of male genitals and inguinal areas as well as transrectal irradiation of prostate gland. HeNe laser (632.8nm/ 2mW at the end of light-guide, inserted into a vein) was used for intravenous LBI. Pulsed IR laser cluster probe (12x890nm/5W pulse power) was used for irradiation of skin projections of male genitals. Pulsed IR diode laser probe (890nm/15W pulse power) with transrectally inserting fiberoptic probe was used for prostate gland irradiation. LLLT started simultaneously with antibiotic, anti-inflammatory and immune therapy.

## **RESULTS**

Patients of group II reported (statistically reliable) faster resolution of symptoms of diseases (pain, dysuria, sex disorders), had better and more stable laboratory investigation reports (reduction and normalisation of leukocytes, elimination of microorganisms from specimens of urethral discharge, prostatic fluid, urine, sperm), grew of quantity and motility, as well as in percentage of normal forms of spermatozoa. Lower relapse rate for patients of group II (11%) than for patients of group I (18%) was recorded. No side effects or complications were detected. The authors estimated therapeutic 3D energy density for transrectal and cluster probe prostate gland irradiation.

The combination of intravenous LBI with local skin and prostate gland irradiation proved to be the most effective method of LLLT. The combination of medication therapy and LLLT provides better and faster resolution of the symptoms and normalization in results of instrumental examinations.

## **DISCUSSION**

Obtained results proved that laser therapy is an acceptable tool in the complex treatment of male genital tract chronic inflammations, caused by STDs. Our studies supported the opinion that acceleration of treatment was mainly the result of activation of immune system and increase of concentration of antibiotics in target organs.

More works are required to study laser light distribution in different tissues to determine the most effective 3D energy density for genital tract organs irradiation, combination of different wavelength lasers and methods of irradiation. Additional investigations are required to determine parameters of laser irradiation as the most promoting activity of immune system, increasing both microorganism sensitivity towards antibiotics and prostate gland permeability for antibiotics to create higher concentration of drugs in genital tract organs as well as to combine UV laser bactericidal action with the effect of antibiotics to achieve maximal medical effect.