

Knee Pain – Osteoarthritis

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The Effect of Low-Level Laser in Knee Osteoarthritis: A Double-Blind, Randomized, Placebo-Controlled Trial.

[Hegedűs B](#), [Viharos L](#), [Gervain M](#), [Gálfi M](#).

1 Physio- and Balneotherapy Center , Orosháza-Gyopáros, Hungary .

Abstract Introduction: Low-level laser therapy (LLLT) is thought to have an analgesic effect as well as a biomodulatory effect on microcirculation. This study was designed to examine the pain-relieving effect of LLLT and possible microcirculatory changes measured by thermography in patients with knee osteoarthritis (KOA). **Materials and Methods:** Patients with mild or moderate KOA were randomized to receive either LLLT or placebo LLLT. Treatments were delivered twice a week over a period of 4 wk with a diode laser (wavelength 830 nm, continuous wave, power 50 mW) in skin contact at a dose of 6 J/point. The placebo control group was treated with an ineffective probe (power 0.5 mW) of the same appearance. Before examinations and immediately, 2 wk, and 2 mo after completing the therapy, thermography was performed (bilateral comparative thermograph by AGA infrared camera); joint flexion, circumference, and pressure sensitivity were measured; and the visual analogue scale was recorded. **Results:** In the group treated with active LLLT, a significant improvement was found in pain (before treatment [BT]: 5.75; 2 mo after treatment : 1.18); circumference (BT: 40.45; AT: 39.86); pressure sensitivity (BT: 2.33; AT: 0.77); and flexion (BT: 105.83; AT: 122.94). In the placebo group, changes in joint flexion and pain were not significant. Thermographic measurements showed at least a 0.5 degrees C increase in temperature-and thus an improvement in circulation compared to the initial values. In the placebo group, these changes did not occur. **Conclusion:** Our results show that LLLT reduces pain in KOA and improves microcirculation in the irradiated area.

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Efficacy of Interferential Low-Level Laser Therapy Using Two Independent Sources in the Treatment of Knee Pain.

[Montes-Molina R](#), [Madroñero-Agreda MA](#), [Romojaro-Rodríguez AB](#), [Gallego-Mendez V](#), [Prados-Cabiedas C](#), [Marques-Lucas C](#), [Pérez-Ferreiro M](#), [Martinez-Ruiz F](#).

1 Unit of Physiotherapy, Hospital Ramón y Cajal , Madrid, Spain .

Abstract Objective: The aim of this study was to evaluate the effectiveness of an interferential pattern generated by two identical and independent lasers in the relief of knee pain.

Background Data: Low-level laser therapy (LLLT) is generally applied by a single probe. **Materials and Methods:** A double-blind controlled clinical trial was performed on 152 patients with knee pain who were randomly assigned into two different groups. Group I patients (n = 76) received interferential laser therapy generated by two identical laser probes located opposite each other on the knee joint. Group II patients (n = 76) received one live probe in conventional laser therapy and one dummy probe. The device used in both groups was an AlGaAs laser (wavelength 810 nm, power 100 mW, in continuous mode). Fifteen laser sessions were applied transcutaneously on 5 knee points (6 J/point) per session. In addition, patients in both groups received a quadriceps strength program based on isometric exercises. A visual analogue scale (VAS) was used for pain evaluation in different situations, such as in standing, in knee flexion/extension, and when going up and down stairs. VAS pain scores were evaluated before, in the middle of, and after treatment. **Results:** ANOVA results showed no significant differences between groups for all VAS scores or in the interaction with the sessions ($p > 0.05$). The VAS score results showed a statistically significant pain reduction throughout all sessions ($p = 0.000$). **Conclusions:** Interferential laser therapy is safe and effective in reducing knee pain. However, the results of the study indicate that it is not superior to the use of a single conventional laser.

[BMC Health Serv Res.](#) 2008 Jul 8;8:145

Measuring physiotherapy performance in patients with osteoarthritis of the knee: a prospective study.

[Jamtvedt G](#), [Dahm KT](#), [Holm I](#), [Flottorp S](#).

Norwegian Knowledge Centre for Health Services, PO Box 7004, St. Olavs plass, 0103Oslo, Norway. grj@kunnskapssenteret.no

BACKGROUND: Patients with knee osteoarthritis [OA] are commonly treated by physiotherapists in primary care. Measuring physiotherapy performance is important before developing strategies to improve quality. The purpose of this study was to measure physiotherapy performance in patients with knee OA by comparing clinical practice to evidence from systematic reviews. **METHODS:** We developed a data-collection form and invited all private practitioners in Norway [n = 2798] to prospectively collect data on the management of one patient with knee OA through 12 treatment session. Actual practice was compared to findings from an overview of systematic reviews summarising the effect of physiotherapy interventions for knee OA. **RESULTS:** A total of 297 physiotherapists reported their management for patients with knee OA. Exercise was the most common treatment used, provided by 98% of the physiotherapists. There is evidence of high quality that exercise reduces pain and improves function in patients with knee OA. Thirty-five percent of physiotherapists used acupuncture, low-level laser therapy or transcutaneous electrical nerve stimulation. There is evidence of moderate quality that these treatments reduce pain in knee OA. Patient education, supported by moderate quality evidence for improving psychological outcomes, was provided by 68%. Physiotherapists used a median of four different treatment modalities for each patient.

They offered many treatment modalities based on evidence of low quality or without evidence from systematic reviews, e.g. traction and mobilisation, massage and stretching. CONCLUSION: Exercise was used in almost all treatment sessions in the management of knee OA. This practice is desirable since it is supported by high quality evidence. Physiotherapists also provide several other treatment modalities based on evidence of moderate or low quality, or no evidence from systematic reviews. Ways to promote high quality evidence into physiotherapy practice should be identified and evaluated.

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Physical Therapy Interventions for Patients With Osteoarthritis of the Knee: An Overview of Systematic Reviews.

[Jamtvedt G](#), [Dahm KT](#), [Christie A](#), [Moe RH](#), [Haavardsholm E](#), [Holm I](#), [Hagen KB](#).

Norwegian Centre for the Health Services, PO Box 7004, St Olavs Plass, N-0130 Oslo, Norway.

Patients with osteoarthritis of the knee are commonly treated by physical therapists. Practice should be informed by updated evidence from systematic reviews. The purpose of this article is to summarize the evidence from systematic reviews on the effectiveness of physical therapy for patients with knee osteoarthritis. Systematic reviews published between 2000 and 2007 were identified by a comprehensive literature search. We graded the quality of evidence across reviews for each comparison and outcome. Twenty-three systematic reviews on physical therapy interventions for patients with knee osteoarthritis were included. There is high-quality evidence that exercise and weight reduction reduce pain and improve physical function in patients with osteoarthritis of the knee. There is moderate-quality evidence that acupuncture, transcutaneous electrical nerve stimulation, and low-level laser therapy reduce pain and that psychoeducational interventions improve psychological outcomes. For other interventions and outcomes, the quality of evidence is low or there is no evidence from systematic reviews.

[Lasers Med Sci.](#) 2008 Jan 5. [Epub ahead of print]

Effect of combined laser acupuncture on knee osteoarthritis: a pilot study.

[Shen X](#), [Zhao L](#), [Ding G](#), [Tan M](#), [Gao J](#), [Wang L](#), [Lao L](#).

Shanghai University of Traditional Chinese Medicine, 1200 Cailun Road, Shanghai, 201203, China.

Our objective was to assess the efficacy and safety of combined 10.6 μm and 650 nm laser irradiation on patients with knee osteoarthritis (OA). Forty patients with OA were randomly allocated to an active laser group or to a placebo laser group (20 per group). They either received active or sham laser treatment at acupoint Dabi (ST 35) in a total of 12 sessions. There was significant difference between the two groups in the Western Ontario and McMaster Universities (WOMAC) osteoarthritis index pain score change from baseline after 2 weeks of treatment ($P = 0.047$). The pain reduction of the active laser treatment group was 49%, whereas that of the placebo control group was only 13%. However, due to the high patient drop-out rate, the 4-week assessment could not be analyzed. Combined laser treatment seems beneficial to patients with knee OA. However, due to the small sample size and the high drop-out rate of patients in the placebo group, a large sample-size clinical trial is warranted to determine further the therapeutic efficacy of the device.

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Laser acupuncture in knee osteoarthritis: a double-blind, randomized controlled study.

[Yurtkuran M.](#), [Alp A.](#), [Konur S.](#), [Ozçakir S.](#), [Bingol U.](#)

Division of Rheumatology, Uludag University Atatürk Rehabilitation Center, Bursa, Turkey. merihcan@hotmail.com

OBJECTIVE: The purpose of this study was to investigate the effects and minimum effective dose of laser acupuncture in knee osteoarthritis (KOA), and to determine if it is superior to placebo treatment (sham) in the evaluation of clinical-functional outcome and quality of life. **METHODS:** In this randomized, placebo-controlled study, patients with grade 2 and 3 primary KOA were selected. Group I ($n = 27$) received 904-nm low-level laser irradiation with 10 mW/cm^2 power density, 4 mW output power, 0.4 cm^2 spot size, 0.48 J dose per session, and 120-sec treatment time on the medial side of the knee to the acupuncture point Sp9. Group II ($n = 25$) received placebo-laser therapy at the same place on the same point. Patients in both of the groups had treatment 5 days per week (total duration of therapy was 10 days) and 20 min per day. The study was comprised of a 2-week (10-session) intervention. Participants were evaluated before treatment (baseline), after treatment (2nd week), and at the 12th week. In this double-blind study, a blind examiner carried out all outcome assessments. The main outcome measures were as follows: pain on movement (pVAS), 50-foot walking time (50 foot w), knee circumference (KC), medial tenderness score (MTS), Western Ontario and McMaster Universities osteoarthritis index (WOMAC), and Nottingham Health Profile (NHP). **RESULTS:** Statistically significant improvement was observed in pVAS, 50 foot w, and KC in group 1. In Group II, statistically significant improvement was observed in pVAS, 50 foot w, and WOMAC. When groups were compared with each other, the improvement observed in KC was superior in Group I at the 2(nd) week ($p = 0.005$). **CONCLUSION:**

Laser acupuncture was found to be effective only in reducing periarticular swelling when compared with placebo laser.

[J Photochem Photobiol B](#). 2007 Jul 27;88(1):11-5. Epub 2007 May 1

The therapeutic effect of low-level laser on repair of osteochondral defects in rabbit knee.

[Kamali F](#), [Bayat M](#), [Torkaman G](#), [Ebrahimi E](#), [Salavati M](#).

Department of Physical Therapy, University of Social Welfare and Rehabilitation, Tehran, Iran. fahimehkamali@hotmail.com

INTRODUCTION: Low level laser therapy (LLLT) has been shown to enhance collagen production and wound healing but its effect on cartilage repair from biomechanical point of view is not known yet. The aim of present study was to evaluate the biomechanical behaviour of repairing osteochondral defect in rabbits which received a pulsed low-level gallium-arsenide (Ga-As) laser irradiation. **MATERIALS AND METHODS:** Osteochondral defects with 5mm diameter and 4mm in depth induced by drilling in right femoral patellar grooves of 41 adolescent male rabbits. They were divided into experimental and control groups. Experimental group received pulsed Ga-As (890nm) laser irradiation with energy density of 4.8J/cm². The rabbits in control group received placebo LLLT with shut-down equipment. The control defects were allowed to heal spontaneously. Each group were divided into three subgroups: A, B and C. Subgroups A, B and C were sacrificed on 4, 8, and 16 weeks after surgery. The knee joint were removed, and the defects were examined biomechanically by in situ-indentation method. The thickness, instantaneous and equilibrium indentation stiffness was measured during the test. Data were analysed using ANOVA and independent sample t-test. **RESULT:** While no difference was observed in the repaired cartilage biomechanical properties among 4th, 8th, 16th weeks in study groups. The equilibrium indentation stiffness of experimental group was significantly higher in 8th week in comparison with control group. **CONCLUSION:** LLLT significantly enhances the stiffness of repairing tissue in the 8th week post injury in osteochondral defects in rabbits.

[Lasers Surg Med](#). 2007 Jul;39(6):543-50.

Low-level laser therapy for zymosan-induced arthritis in rats: Importance of illumination time.

[Castano AP](#), [Dai T](#), [Yaroslavsky I](#), [Cohen R](#), [Apruzzese WA](#), [Smotrich MH](#), [Hamblin MR](#).

Wellman Center for Photomedicine, Massachusetts General Hospital, Boston, Massachusetts 02114, USA.

BACKGROUND: It has been proposed for many years that low-level laser (or light) therapy (LLLT) can ameliorate the pain, swelling, and inflammation associated with various forms of arthritis. Light is thought to be absorbed by mitochondrial chromophores leading to an increase in adenosine triphosphate (ATP), reactive oxygen species and/or cyclic AMP production and consequent gene transcription via activation of transcription factors. However, despite many reports about the positive effects of LLLT in arthritis and in medicine in general, its use remains controversial. For all indications (including arthritis) the optimum optical parameters have been difficult to establish and so far are unknown. **METHODS:** We tested LLLT on rats that had zymosan injected into their knee joints to induce inflammatory arthritis. We compared illumination regimens consisting of a high and low fluence (3 and 30 J/cm²), delivered at high and low irradiance (5 and 50 mW/cm²) using 810-nm laser light daily for 5 days, with the positive control of conventional corticosteroid (dexamethasone) therapy. **RESULTS:** Illumination with 810-nm laser was highly effective (almost as good as dexamethasone) at reducing swelling and a longer illumination time (10 or 100 minutes compared to 1 minute) was more important in determining effectiveness than either the total fluence delivered or the irradiance. LLLT induced reduction of joint swelling correlated with reduction in the inflammatory marker serum prostaglandin E₂ (PGE₂). **CONCLUSION:** LLLT with 810-nm laser is highly effective in treating inflammatory arthritis in this model. Longer illumination times were more effective than short times regardless of total fluence or irradiance. These data will be of value in designing clinical trials of LLLT for various arthritides.

[BMC Musculoskelet Disord.](#) 2007 Jun 22;8:51.

Short-term efficacy of physical interventions in osteoarthritic knee pain. A systematic review and meta-analysis of randomised placebo-controlled trials.

[Bjordal JM](#), [Johnson MI](#), [Lopes-Martins RA](#), [Bogen B](#), [Chow R](#), [Ljunggren AE](#).

Faculty of Health and Social Sciences, Institute of Physiotherapy, Bergen University College, Moellendalsvn, Bergen Norway. jmb@hib.no

BACKGROUND: Treatment efficacy of physical agents in osteoarthritis of the knee (OAK) pain has been largely unknown, and this systematic review was aimed at assessing their short-term efficacies for pain relief. **METHODS:** Systematic review with meta-analysis of efficacy within 1-4 weeks and at follow up at 1-12 weeks after the end of treatment. **RESULTS:** 36 randomised placebo-controlled trials (RCTs) were identified with 2434 patients where 1391 patients received active treatment. 33 trials satisfied three or more out of five methodological criteria (Jadad scale). The patient sample had a mean age of 65.1 years and mean baseline pain of 62.9 mm on a 100 mm visual analogue scale (VAS). Within 4 weeks of the commencement of treatment manual acupuncture, static magnets and ultrasound therapies did not offer statistically significant short-term pain relief over placebo. Pulsed electromagnetic fields offered a small reduction in pain of 6.9

mm [95% CI: 2.2 to 11.6] (n = 487). Transcutaneous electrical nerve stimulation (TENS, including interferential currents), electro-acupuncture (EA) and low level laser therapy (LLLT) offered clinically relevant pain relieving effects of 18.8 mm [95% CI: 9.6 to 28.1] (n = 414), 21.9 mm [95% CI: 17.3 to 26.5] (n = 73) and 17.7 mm [95% CI: 8.1 to 27.3] (n = 343) on VAS respectively versus placebo control. In a subgroup analysis of trials with assumed optimal doses, short-term efficacy increased to 22.2 mm [95% CI: 18.1 to 26.3] for TENS, and 24.2 mm [95% CI: 17.3 to 31.3] for LLLT on VAS. Follow-up data up to 12 weeks were sparse, but positive effects seemed to persist for at least 4 weeks after the course of LLLT, EA and TENS treatment was stopped. CONCLUSION: TENS, EA and LLLT administered with optimal doses in an intensive 2-4 week treatment regimen, seem to offer clinically relevant short-term pain relief for OAK.

[J Photochem Photobiol B](#). 2007 May 25;87(2):81-7. Epub 2007 Feb 24

Effect of low-level helium-neon laser therapy on histological and ultrastructural features of immobilized rabbit articular cartilage.

[Bayat M](#), [Ansari E](#), [Gholami N](#), [Bayat A](#).

Cellular and Molecular Biology Research Center and Anatomy Department, Medical Faculty, Shaheed Beheshti Medical University, Tehran, Iran. bayat_m@yahoo.com <bayat_m@yahoo.com>

The present study investigates whether low-level helium-neon laser therapy can increase histological parameters of immobilized articular cartilage in rabbits or not. Twenty five rabbits were divided into three groups: the experiment group, which received low-level helium-neon laser therapy with 13J/cm² three times a week after immobilization of their right knees; the control group which did not receive laser therapy after immobilization of their knees; and the normal group which received neither immobilization nor laser therapy. Histological and electron microscopic examinations were performed at 4 and 7 weeks after immobilization. Depth of the chondrocyte filopodia in four-week immobilized experiment group, and depth of articular cartilage in seven-week immobilized experiment group were significantly higher than those of relevant control groups (exact Fisher test, p=0.001; student's t-test, p=0.031, respectively). The surfaces of articular cartilages of the experiment group were relatively smooth, while those of the control group were unsmooth. It is therefore concluded that low-level helium-neon laser therapy had significantly increased the depth of the chondrocyte filopodia in four-week immobilized femoral articular cartilage and the depth of articular cartilage in seven-week immobilized knee in comparison with control immobilized articular cartilage.

[Osteoarthritis Cartilage](#). 2006 Apr;14(4):377-83. Epub 2005 Dec 13

Effects of helium-neon laser on the mucopolysaccharide induction in experimental osteoarthritic cartilage.

[Lin YS](#), [Huang MH](#), [Chai CY](#).

Kun Shan University, Tainan, Taiwan, ROC.

OBJECTIVE: To investigate the effects of mucopolysaccharide induction after treatment by low power laser for experimental osteoarthritis (OA). **METHODS:** Seventy-two rats with three different degrees of papain induced OA over right knee joints were collected for helium-neon (He-Ne) laser treatment. The severity of induced arthritis was measured by ^{99m}Tc bone scan and classified into three groups (I-III) by their radioactivity ratios (right to left knee joints). The rats in each group were further divided into study subgroups (Is, IIs, and IIIs) and control subgroups (Ic, IIc, and IIIc) randomly. The arthritic knees in study subgroups received He-Ne laser treatment, and those in controls received sham laser treatment. The changes of arthritic severity after treatment and follow-up 2 months later were measured. The histopathological changes were evaluated through light microscope after disarticulation of sections (H.E. stain), and the changes of mucopolysaccharide density in cartilage matrix were measured by Optimas scanner analyzer after Alcian blue (AB) stain. The densities of mucopolysaccharide induced after treatment in arthritic cartilage were compared and correlated with their histopathological changes. **RESULTS:** The density of mucopolysaccharide rose at the initial stage of induced arthritis, and decreased progressively in later stages. The densities of mucopolysaccharide in treated rats increased upon complete laser treatment more than those of the controls, which is closely related with the improvement in histopathological findings, but conversely with the changes in arthritic severity. **CONCLUSION:** He-Ne laser treatment will enhance the biosynthesis of arthritic cartilage, and results in the improvement of arthritic histopathological changes.

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Low-level laser therapy improves early healing of medial collateral ligament injuries in rats.

[Bayat M](#), [Delbari A](#), [Almaseyeh MA](#), [Sadeghi Y](#), [Bayat M](#), [Reziae F](#).

Cell and Molecular Biology Research Center, Medical School, Shaheed Beheshti University of Medical Sciences, Tehran, Iran. bayat_m@yahoo.com

OBJECTIVE: This study sought to investigate whether or not low-level laser therapy (LLLT) with a helium-neon laser increased biomechanical parameters of transected medial collateral ligament (MCL) in rats. **BACKGROUND DATA:** It has been reported that LLLT can enhance tendon healing. **METHODS:** Thirty rats received surgical transection to their right MCL, and five were assigned as the control group. After

surgery, the rats were divided into three groups: group 1 (n = 10) received LLLT with 0.01 J/cm² energy density per day, group 2 (n = 10) received LLLT with 1.2 J/cm² energy density per day, and group 3 (sham = exposed group; n = 10) received daily placebo laser with shut-down laser equipment, while the control group received neither surgery nor LLLT. Biomechanical tests were performed at 12 and 21 days after surgery. The data were analyzed by one-way analysis of variance. RESULTS: The ultimate tensile strength (UTS) of group 2 on day 12 was significantly higher than that of groups 1 and 3. Furthermore, the UTS and energy absorption of the control (uninjured) group were significantly higher than those of the other groups. CONCLUSIONS: LLLT with a helium-neon laser is effective for the early improvement of the ultimate tensile strength of medial collateral ligament injuries.

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In vivo Study of the Inflammatory Modulating Effects of Low Level Laser Therapy on iNOS Expression Using Bioluminescence Imaging.

[Moriyama Y](#), [Moriyama EH](#), [Blackmore K](#), [Akens MK](#), [Lilge L](#).

Ontario Cancer Institute Princess Margaret Hospital.

This study was designed to demonstrate that bioluminescence imaging (BLI) can be used as a new tool to evaluate the effects of low level laser therapy (LLLT) during in vivo inflammatory process. Here, the efficacy of LLLT in modulating inducible nitric oxide synthase (iNOS) expression using different therapeutic wavelengths was determined using transgenic animals with the luciferase gene under control of the iNOS gene expression. Thirty transgenic mice (FVB/N-Tg(iNOS-luc)Xen) were allocated randomly to one of four experimental groups treated with different wavelengths ($\lambda=635, 785, 808$ and 905nm) or a control group (non-treated). Inflammation was induced by intra-articular injection of Zymosan A in both knee joints. Laser treatment ($25\text{mW}\cdot\text{cm}^{-2}$, 200 s, $5\text{J}\cdot\text{cm}^{-2}$) was applied to the knees 15 minutes (or min) after inflammation induction. Measurements of iNOS expression were performed at various times (0, 3, 5, 7, 9 and 24h) by measuring the bioluminescence signal using a highly sensitive charge-coupled device (CCD) camera. The results showed a significant increase in BLI signals after irradiation with 635nm laser when compared to both the non-irradiated animals and the other LLLT treated groups indicating wavelength-dependence of LLLT effects on iNOS expression during the inflammatory process. Histological analysis was also performed and demonstrated the presence of fewer inflammatory cells in the synovial joints of mice irradiated with 635nm compared to non-irradiated knee joints. BLI demonstrated an action spectrum of iNOS gene expression following LLLT in vivo.

THE EFFECT OF LOW POWER LASER THERAPY ON OSTEOARTHRITIS OF THE KNEE

Basirnia A., Sadeghipoor G., Esmaeeli Djavid G. et al.

Treatment was performed on 20 patients, aging from 42 to 60 years. All patients had received conservative treatment with poor results. Laser device used for this treatment was pulsed IR diode laser; 810 nm wavelength once per day for 5 consecutive days, followed by a 2-day interval. The total number of applications was 12 sessions. Irradiation was performed on 5 periarticular tender points, each for 2 min. The treatment outcome (pain relief and functional ability) was observed and measured according to the following methods: 1) Numerical rating scales (NRS), 2) Self assessment by the patient, 3) Index of severity for osteoarthritis of the knee (ISK), 4) Analgesic requirements. We achieved significant improvement in pain relief and quality of life in 70% of patients, comparing to their previous status ($p < 0.05$). There was no significant change in range of motion of the knee.

[J Am Geriatr Soc.](#) 1992 Jan;40(1):23-6.

Improvement of pain and disability in elderly patients with degenerative osteoarthritis of the knee treated with narrow-band light therapy.

[Stelian J](#), [Gil I](#), [Habit B](#), [Rosenthal M](#), [Abramovici I](#), [Kutok N](#), [Khahil A](#).
Geriatric Medical Center, Shmuel Harofe Hospital, Beer Yaakov, Israel.

OBJECTIVE: To evaluate the effects of low-power light therapy on pain and disability in elderly patients with degenerative osteoarthritis of the knee. **DESIGN:** Partially double-blinded, fully randomized trial comparing red, infrared, and placebo light emitters. **PATIENTS:** Fifty patients with degenerative osteoarthritis of both knees were randomly assigned to three treatment groups: red (15 patients), infrared (18 patients), and placebo (17 patients). Infrared and placebo emitters were double-blinded. **INTERVENTIONS:** Self-applied treatment to both sides of the knee for 15 minutes twice a day for 10 days. **MAIN OUTCOME MEASURES:** Short-Form McGill Pain Questionnaire, Present Pain Intensity, and Visual Analogue Scale for pain and Disability Index Questionnaire for disability were used. We evaluated pain and disability before and on the tenth day of therapy. The period from the end of the treatment until the patient's request to be retreated was summed up 1 year after the trial. **RESULTS:** Pain and disability before treatment did not show statistically significant differences between the three groups. Pain reduction in the red and infrared groups after the treatment was more than 50% in all scoring methods (P less than 0.05). There was no significant pain improvement in the placebo group. We observed significant functional improvement in red- and infrared-treated groups (p less than 0.05), but not in the placebo group. The period from the end of treatment until the patients required treatment was longer for red and infrared groups than for the placebo group (4.2 +/- 3.0, 6.1 +/- 3.2, and 0.53 +/- 0.62 months, for red, infrared, and placebo, respectively). **CONCLUSIONS:** Low-power light therapy is effective in relieving pain and disability in degenerative osteoarthritis of the knee.

[Radiol Med \(Torino\).](#) 1998 Apr;95(4):303-9.

[Low-level laser therapy in osteoarticular diseases in geriatric patients]

[Article in Italian]

[Giavelli S](#), [Fava G](#), [Castronuovo G](#), [Spinoglio L](#), [Galanti A](#).

Dipartimento di Radiologia e Laserterapia, Istituto Gerontologico Pio Albergo Trivulzio, Milano.

INTRODUCTION: Laser light absorption through the skin causes tissue changes, targeting the nervous, the lymphatic, the circulatory and the immune systems with an antalgic, anti-inflammatory, anti-edemic effect and stimulating tissue repair. Therefore low level laser therapy is now commonly used in numerous rehabilitation centers, including the "Istituto Gerontologico Pio Albergo Trivulzio", Milan, Italy. However, to activate the treatment program, the basic medical research results must always be considered to choose the best optical wavelength spectrum, technique and dose, for rehabilitative laser therapy. We analyzed the therapeutic effects of different wavelengths and powers in various treatment schedules. In particular, a protocol was designed to test such physical parameters as laser type, doses and individual schedule in different pathologic conditions. We report the results obtained with low level laser therapy in the rehabilitation of geriatric patients, considering the various physical and technical parameters used in our protocol. **MATERIAL AND METHODS:** We used the following laser equipment: an HeNe laser with 632.8 nm wavelength (Mectronic), a GaAs Laser with 904 nm wavelength (Mectronic) and a CO₂ Laser with 10,600 nm wavelength (Etoile). To evaluate the patient clinical status, we use a different form for each involved joint; the laser beam is targeted on the region of interest and irradiation is carried out with the sweeping method or the points technique. Irradiation technique, doses and physical parameters (laser type, wavelength, session dose and number) are indicated on the form. The complete treatment cycle consists of 5 sessions per week--20 sessions in all. At the end of the treatment cycle, the results were scored on a 5-grade semiquantitative scale--excellent, good, fair, poor and no results. We examined 3 groups of patients affected with gonarthrosis (149 patients), lumbar arthrosis (117 patients), and algodystrophy (140 patients) respectively. **RESULTS:** In gonarthrosis patients, the statistical analysis of the results showed no significant differences between CO₂ laser and GaAs laser treatments ($p = .975$), but significant differences between CO₂ laser and HeNe laser treatments ($p = .02$) and between GaAs laser and HeNe laser treatments ($p = .003$). In lumbar arthrosis patients treated with GaAs or HeNe laser, significant differences were found between the two laser treatments and the combined sweeping-points techniques appeared to have a positive trend relative to the sweeping method alone, especially in sciatic suffering. In the algodystrophy syndrome, in hemiplegic patients, significant differences were found between CO₂ and HeNe laser treatments ($p = .026$), between high and low CO₂ laser doses ($p = .024$), and between low CO₂ laser dose and high HeNe laser dose ($p = .006$). **CONCLUSIONS:** Low level laser therapy can be used to treat osteoarticular pain in geriatric patients. To optimize the results, the diagnostic picture must be correct and a

treatment program defining the physical parameters used (wavelength, dose and irradiation technique) must also be designed.

Improvement of pain and disability in elderly patients with degenerative osteoarthritis of the knee treated with narrow-band light therapy.

Stelian J, Gil I, Habot B et al. J Am Geriatr Soc. 1992; 40: 23-26.

In an Israeli study the effect of laser therapy in degenerative osteoarthritis (DOA) of the knee was investigated in a double blind study among 50 patients. One group received infrared (GaAlAs) and one red (HeNe) laser. Only the first group could be blinded, while the latter was open. Patients were treated twice daily, 15 minutes each time, for 10 days. The patients treated themselves after instruction. Total dose for each session was 10.3 J for red and 11.1 for infrared. Continuous mode was used for 7.5 minutes, pulsed for 7.5 minutes, rationale not stated. There was a significant pain reduction in the laser groups as compared to the placebo groups. There was no significant difference between the red and the infrared group. The Disability Index Questionnaire also revealed an improvement in the laser groups. All patients in the placebo group required analgesics within two months after laser therapy while the patients in the laser group were pain free ranging from 2 months to 1 year.