

Regenerative Laser Therapy
CLINICAL STUDIES

Hilterapia®



a VCA ANTECH company



CLINICAL STUDIES

The following studies delineate the therapeutic effects observed in clinical applications derived from laser activity at cell and tissue level. RLT-Vet™, invented and patented by El.En, thanks to its characteristics, is able to decrease pain. This is due to the results of two mechanisms: the action on pain symptomatology and on inflammation at the site affected by disease. The method is safe, effective and is free of significant side effects, as evidenced by the results obtained treating a large number of patients.

AUTHORS: Viliani T, Carabba C, Mangone G, Pasquetti P

INSTITUTIONS:

Agency for Recovery and Rehabilitation, AOU Careggi, Florence, Italy

YEAR: 2012

High Intensity Pulsed Nd:YAG Laser in painful knee osteoarthritis: the biostimulating protocol.

JOURNAL: Energy for Health; 9:18-22

ABSTRACT: Laser therapy is a widely used instrumental methodology in the physiotherapy treatment of osteoarthritis pain. High Intensity Laser Therapy (HILT, Nd:YAG laser) in last years proved to be effective in painful Knee Osteoarthritis (KO), due to its high intensity and to the depth reached by the laser ray. Several HILT protocols are available to treat this condition, in relation to the phase of the disease and to the clinical data of the patient.

Aim of this study was to analyze the clinical efficacy and the safety of HILT, using a biostimulating protocol in patients with symptomatic KO. 34 out-patients with symptomatic KO (IIIII Kellgren-Lowrence Scale stage) were enrolled and randomized to treatment (16 patients, Group A) or to waiting list (18 patients, Group B). The study is an open-label, before and after study. The treatment consisted in HILT biostimulating treatment (10 sessions, three time a week) for Group A and no treatment for Group B. The patients were assessed by WOMAC Scale, before treatment (t0), after treatment (t1) and after 4 months (t2). At the same time intervals were assessed the patients in the waiting list. HILT-treated patients showed a highly statistically significant improvement between t0 and t1 in WOMAC scale, and the improvement was maintained at follow-up (t2), while the patients in the waiting list showed a worsening tendency.

No side effect was found in the treated group. The HILT treated patients showed good clinical results, in pain and functional items. We conclude that this HILT protocol seems a good medical instrument for pain control in KO and for improvement of patient's quality of life.

AUTHORS: Monici M¹, Cialdai F², Romano G², Fusi F², Egli M³, Pezzatini S⁴, Morbidelli L⁴

INSTITUTIONS:

¹ASAcampus, ASA Research Division, Dept. of Clinical Physiopathology, University of Florence, Florence, Italy

²Dept. of Clinical Physiopathology, University of Florence, Florence, Italy

³Space Biology Group, ETH-Technopark, Zurich, Switzerland

⁴Section of Pharmacology, Department of Molecular Biology, University of Siena, Siena, Italy

YEAR: 2011

An In Vitro Study on Tissue Repair: Impact of Unloading on Cells Involved in the Remodelling Phase

JOURNAL: Microgravity Science and Technology; 23(4):391-401

ABSTRACT: The number of astronauts involved in long lasting missions and extra-vehicular activities is going to increase in the future. Consequently, the chance of injury due to traumatic events or unexpected emergency surgery will also increase and medical evacuation times to earth will be prolonged. Hence, the need to address requirements for surgery and trauma care in non terrestrial environments will be a priority. Tissue repair in weightlessness should therefore be regarded as a major issue not enough studied to date. Wound healing is a complex multi-step process, crucial to the survival of the organism. It starts with an inflammatory phase followed by a remodelling phase. During repair, the extracellular matrix (ECM) is sequentially remodeled by the concerted action of different cell types, in order to rebuild a functional tissue.

The available literature concerning wound healing with mechanical unloading presents controversial results. However, many studies indicate impairment of the healing processes. Here we present a study on the behavior of cells involved in the remodelling phase of repair, e.g. fibroblasts and endothelial cells, in response to microgravity (μg). In particular, their adhesion/migration, cytoskeleton organization, production of ECM molecules and receptors have been investigated.

Cell response to pulsed Nd:YAG laser irradiation has also been investigated in order to evaluate the possibility to use laser irradiation for counteracting the effect of μg on wound healing. In μg , we observed alterations in production/assembly of ECM molecules. Increased fibronectin (FN) and laminin (LM) could be the cause for impaired ECM rebuilding and altered cell adhesion/migration. Treatment with Nd:YAG laser pulses induced organized fibrillogenesis and favoured endothelial cell spreading and monolayer formation. These findings open the way for a better understanding of tissue repair mechanisms in space and future clinical applications on earth.

AUTHORS: Fiore P¹, Panza F², Cassatella G¹, Russo A¹, Frisardi V³, Solfrizzi V³, Ranieri M⁴, Di Teo L⁵, Santamato A¹

INSTITUTIONS:

¹Department of Physical Medicine and Rehabilitation University of Foggia, Foggia, Italy;

²Geriatric Unit and Gerontology-Geriatric Research Laboratory IRCCS Casa Sollievo della Sofferenza, San Giovanni Rotondo, Italy;

³Department of Geriatrics Center for Aging Brain, Memory Unit, University of Bari, Bari, Italy

⁴Department of Physical Medicine and Rehabilitation University of Bari, Bari, Italy

⁵OSMAIRM Rehabilitation Center, Laterza, Taranto, Italy

YEAR: 2011

Short-term effects of high-intensity laser therapy versus ultrasound therapy in the treatment of low back pain: a randomized controlled trial

JOURNAL: Eur J Phys Rehabil Med; 47(3):367-73

BACKGROUND: Low back pain (LBP) is a common musculoskeletal disorder that is highly prevalent in the general population. Management of this pathology includes numerous interventions depending on pain severity: analgesic, nonsteroidal anti-inflammatory drugs, steroid injections. However, the effect size and duration of symptom relief are limited. Physical therapy (ultrasound [US], laser therapy, manual therapy, interferential current therapy, Back School, aerobic work, therapeutic aquatic exercise acupuncture) have been reported often with mixed results.

Aim. To evaluate the short-term effectiveness of high-intensity laser therapy (HILT) versus ultrasound (US) therapy in the treatment of LBP.

DESIGN: Randomized clinical trial.

SETTING: University hospital.

POPULATIONS: Thirty patients with LBP were randomly assigned to a HILT group or a US therapy group.

METHODS: Study participants received fifteen treatment sessions of HILT or US therapy over a period of three consecutive weeks (five days/week).

RESULTS: For the 30 study participants there were no between-group differences at baseline in Visual Analogic Scale (VAS) and Oswestry Low Back Pain Disability Questionnaire (OLBPDQ) scores. At the end of the 3-week intervention, participants in the HILT group showed a significantly greater decrease in pain (measured by the VAS) and an improvement of related disability (measured by the OLBPDQ) compared with the group treated with US therapy.

CONCLUSION: Our findings obtained after 15 treatment sessions with the experimental protocol suggested greater effectiveness of HILT than of US therapy in the treatment of LBP, proposing HILT as a promising new therapeutic option into the rehabilitation of LBP.

AUTHORS: Viliani T, Pasquetti P

INSTITUTIONS:

Agency for Recovery and Rehabilitation, AOU Careggi, Florence, Italy

YEAR: 2011

High intensity laser-therapy in hand osteoarthritis: a mixed protocol's proposal

JOURNAL: Energy for Health; 8:8-11

ABSTRACT: Hand osteoarthritis (HOA) is a common chronic condition involving one or more joints of the thumb and fingers. Therapeutic approach in hand osteoarthritis must consider local interventions which are useful along the course of the pathology. Laser-therapy (Low Level Laser Therapy-LLLT-) is a possible useful instrumental therapy. High Intensity Laser Therapy (HILT) seems to be more effective than LLLT in pain and disability management of some forms of osteoarthritis, due to its higher intensity and to the depth reached by the laser ray. HILT may be used also in laser-acupuncture.

The aim of this study was to analyze the efficacy of HILT in patients with symptomatic HOA, using a mixed protocol, analgesic anti-inflammatory protocol plus laser-acupuncture. 18 out-patients with symptomatic HOA (II-III Kellgren-Lawrence Grading Index) were enrolled and evaluated by Australian Canadian Osteoarthritis Hand Index (AUSCAN) and Visual-Analogue Scale (VAS), before treatment (t0), after treatment (t1) and after 3 months (t2). The patients were treated with a mixed HILT protocol, analgesic plus laseracupuncture treatment (4 sessions, once a week).

The patients showed a mean statistically significant improvement between t0 and t1 in AUSCAN Index and VAS, and improvement was found in 83% of the subjects (15/18). The improvement was mostly maintained at follow-up. The mixed HILT protocol showed good results in a great percentage of HOA patients, with only 4 treatment sessions.

We conclude that this kind of HILT protocol could be a good proposal for pain control and for improvement of patient's quality of life.

AUTHORS: Munarolo D¹, De Lazzari F¹, Giordan N²

INSTITUTIONS:

¹Unit of Orthopaedics and Physiotherapy and Sports Medicine, Treviso, Italy

²Clinical Research Department, Fidia Farmaceutici S.p.A, Abano Terme, Padua, Italy

YEAR: 2011

Randomized, controlled, clinical study to evaluate the efficacy and safety of glucosamine hydrochloride and chondroitin sulphate in combination with physical therapy (HIRO+kinesitherapy) versus physical therapy alone in patients suffering from osteoarthritis of the knee

JOURNAL: Medicina dello Sport; 64(2):159-71

AIM: Glucosamine and chondroitin sulphate are high molecular weight polysaccharides (glycosaminoglycans), which are among the essential constituent components of articular cartilage. In vitro, glucosamine has been shown to alter the metabolism of chondrocytes and play an immunoregulatory function, an action that could reduce in-flammation. Chondroitin sulphate in physiological conditions, contributes to the elasticity of cartilage and inhibits its degradation by enzymes such as elastase and hyaluronidase. The combined use of glucosamine and chondroitin sulphate could have a synergistic role in reducing the symptoms and slowing down the advance of joint damage in osteoarthritis patients. Based on these assumptions, we have studied the effectiveness and tolerance of the association of glucosamine hydrochloride and chondroitin sulphate in improving pain symptoms and joint function in patients affected by osteoarthritis of the knee.

METHODS: A single site, randomized, prospective, controlled study, was conducted for a duration of 24 weeks, to assess the safety and efficacy of taking glucosamine and chondroitin sulphate, for the treatment of knee osteoarthritis (OA). Sixty patients, with knee OA (documented by X-ray), were divided randomly into two treatment groups. In GROUP A patients were treated with a cycle of 3 weeks of laser therapy and a cycle of 24 weeks of kinesitherapy, while in GROUP B the same treatment protocol was associated with the administration of three capsules per day of the association of glucosamine hydrochloride and chondroitin sulphate.

RESULTS: The Wilcoxon test conducted in pairs at different time intervals in the two treatment groups, showed a reduction in pain as well as an improvement in joint function in both follow-up visits (3 and 6 months from baseline) for all the efficacy variables. In particular, at month six, GROUP B treated with the association of glucosamine hydrochloride with chondroitin sulphate, compared to GROUP A, showed a significant improvement from baseline to endpoint pain in movement (measured by VAS - 41.2 mm vs. -26.2 mm); Lequesne's index (-3.8 vs. -0.9); and the intensity of crepitus (33% vs. 6%).

CONCLUSION: The association of glucosamine hydrochloride with chondroitin sulphate therapy associated with nonpharmacological treatments (HIRO and kinesitherapy) is configured as an alternative to current therapies for the treatment of osteoarthritis.

AUTHORS: Ebid AA¹, Thabet AA², Helal OF³

INSTITUTIONS:

¹Department for surgery, Faculty of Physical Therapy, Cairo University, Egypt

²Department for Obstetrics and Gynecology, Faculty of Physical Therapy, Cairo University, Egypt

³Department of Internal Medicine, Faculty of Physical Therapy, Cairo University, Egypt

YEAR: 2011

Effect of pulsed high intensity Nd:YAG laser in treatment of chronic diabetic foot ulcer

JOURNAL: Energy for Health; 7:25-30

ABSTRACT: Delayed wound healing specially in diabetic ulcer is continuing challenge in rehabilitation medicine despite some recent advances in understanding of its basic principles and problems in wound healing that continue to cause significant morbidity and mortality. The aim of this study was to determine the effect of Pulsed High Intensity Nd:YAG Laser in the treatment of chronic diabetic foot ulcer (Deep Ulcer grade 2) and suggest laser protocol far wound healing. Forty patients suffering far chronic diabetic foot ulcer as a complication of diabetes mellitus, aged 40-70 years (mean age 58.17 ± 9.83), were included. Patients were randomized far treatment in two groups.

In the group A (HILT group), twenty patients received 24 session of pulsed high intensity Nd:YAG laser according to designed protocol, 3 times per week in addition to standard medical treatment which is given far diabetic foot patients. In the group B (Standard Medical Therapy Group), twenty patients received standard medical treatment for 24 sessions, three times per week. The result of this study revealed that there was statistical significant reduction in wound surface area far group (A) after 12 and 24 sessions. The results have demonstrated the objective effect of pulsed high intensity Nd:YAG laser in treatment of chronic diabetic foot ulcer.

Therefore, pulsed high intensity Nd:YAG laser is effective, innovative, non invasive, non expensive and can be used as a new trend physical therapy modality in the treatment of chronic diabetic foot ulcer.

AUTHORS: Fedele D^{1,2}, Fusi F³

INSTITUTIONS:

¹Specialization School in Medical Physic , Faculty of Medicine and Surgery, University of Florence, Italy

²Institute of Applied Physics, Italian National Research Council, Sesto Fiorentino, Italy

³Medical Physics Section, Department of Clinical Physiopathology, University of Florence, Florence, Italy

YEAR: 2010

Thermal effects of NIR laser radiation in biological tissue: a brief survey

JOURNAL: Energy for Health; 6:10-15

ABSTRACT: In this survey the laser-tissue interaction has been considered, with particular attention to thermal effects. Then Pulse Intensity Fluence formula for the Hilterapia pulse was retrieved. Thereafter PIF formula was applied with the lasers parameters used in some medical laser application to compare PIF values.

In our opinion, PIF formula is easier to better understand HILT features and its differences with LLLT and Continuous Wave (CW) Power Lasers

AUTHORS: Fortuna D¹, Masotti L²

INSTITUTIONS:

¹PhotoBiolab Unit of the El.En Group, Florence, Italy

²Dept. of Electronics and Telecommunications, University of Florence, Florence, Italy

YEAR: 2010

The HILT domain by the pulse intensity fluence (pif) formula

JOURNAL: Energy for Health; 5:12-19

ABSTRACT: Laser therapy is often used to give relief in acute and chronic pain, increase the speed, quality and tensile strength of tissue repair, and improve the function of damaged neurological tissue. Treatment with laser beams is painless and causes neither a macro-chemical change nor damage in the tissue. In view of the unsatisfactory results obtained with Low Level Laser Therapy (LLLT) in deeper tissue regeneration, we studied the possible use of power laser designing a more efficient system and a new method of treating, faster and more consistently reproducible results. Specifically, LLLT can only produce either the photochemical effect or the photochemical and photo-thermal effects but not all three. Pulsed emission can be used to induce photomechanical effects. HILT principally induces photomechanical and photo-thermal by means of pulsed laser emission characterized by a particular shape of pulse. Unfortunately the formulas commonly used in the laser matter are not able to perfectly describe the HILT pulse shape and its timing and spatial distribution. The aim of our study was to define a phenomenological formula to describe HILT pulse shape putting together both bi-three dimensional and its timing resolution.

From our experimental data, collected in more of ten years, we extrapolated a mathematical common denominator able to synthesize, in just one formula (PIF), the HILT pulse features.

Applying PIF formula we simulated different possible configurations for HILT, we related it with our clinical and experimental data and we defined the HILT domain in terms of antiinflammatory effect, tissue repair, tissue regeneration and toxic dose. Correlating these data with biological effects of HILT we defined the HILT domains, which are, in our opinion, useful to exactly define the biological capabilities of HILT. In our opinion, PIF formula is easier to better understand HILT features and its differences with LLLT and Continuous Wave (CW) Power Lasers.

- 8 *VILIANI T, CARABBA C, MANGONE G, PASQUETTI P (2012)*
High Intensity Pulsed Nd:YAG Laser in painful knee osteoarthritis: the biostimulating protocol
ENERGY FOR HEALTH 9:18-22
- 9 *MONICI M, CIALDAI F, ROMANO G, FUSI F, EGLI M, PEZZATINI S, MORBIDELLI L (2011)*
An in Vitro Study on Tissue Repair: Impact of Unloading on Cells Involved in the Remodelling Phase
MICROGRAVITY SCIENCE AND TECHNOLOGY 23 (4): 391-401
- 10 *FIGLIORE P, PANZA F, CASSATELLA G, RUSSO A, FRISARDI V, SOLFRIZZI V, RANIERI M, DI TEO L, SANTAMATO A (2011)*
Short-term effect of high intensity laser therapy versus ultrasound therapy in the treatment of low back pain: a randomized controlled trial
EUR J PHYS REHABIL. MED 47(3):367-73
- 11 *VILIANI T, PASQUETTI P (2011)*
High Intensity Laser Therapy in hand osteoarthritis: a mixed protocol's proposal
ENERGY FOR HEALTH 8:8-11
- 12 *MUNAROLO D, DE LAZZARI F, GIORDAN N (2011)*
Randomized, controlled, clinical study to evaluate the efficacy and safety of glucosamine hydrochloride and chondroitin sulphate in combination with physical therapy (HIRO-kinesitherapy) versus physical therapy alone in patients suffering from osteoarthritis of the knee
MEDICINA DELLO SPORT 64(2) 159-71
- 13 *EBID AA, THABET AA, HELAL OF (2011)*
Effect of pulsed high intensity Nd:YAG laser in treatment of chronic diabetic foot ulcer
ENERGY FOR HEALTH 7:25-30
- 14 *FEDELE D, FUSI F (2010)*
Thermal effects of NIR laser radiation in biological tissue: a brief survey
ENERGY FOR HEALTH 6:10-15
- 15 *FORTUNA D, MASOTTI L (2010)*
The HILT domain by the pulse intensity fluence (pif) formula
ENERGY FOR HEALTH 5:12-19
- 16 *CIALDAI F, MONICI M (2010)*
Relationship between cellular and systematic effects of pulsed Nd:YAG laser
ENERGY FOR HEALTH 5:4-9
- 17 *VISSARAKIS G, CHARAMIDIS N (2010)*
The challenge of shoulder pain
ENERGY FOR HEALTH 5:20-24
- 18 *High intensity Laser Therapy in knee osteoarthritis: comparison between two different pulsed-laser treatment protocols*
ENERGY FOR HEALTH 5:26-29
- 19 *SANTAMATO A, SOLFRIZZI V, PANZA F, TONDI G, FRISARDI V, LEGGIN BG, RANIERI M, FIORE P (2009)*
Short-term Effects of High-Intensity Laser Therapy Versus Ultrasound Therapy in the Treatment of People With Subacromial Impingement Syndrome: A Randomized Clinical Trial
PHYSICAL THERAPY 89 (7):643-652
- 20 *SABBAHI S. (2009)*
Clinical experience using Hilterapia in "knee arthrosis"
ENERGY FOR HEALTH 4:24-27
- 21 *MONICI M, ROMANO G, CIALDAI F, FUSI F, MARZILIANO N, BENVENUTI S, CELLAI I, EGLI M, COGOLI A (2008)*
Gravitational/mechanical factors affect gene expression profile and phenotypic specification of human mesenchymal stem cells
JOURNAL OF GRAVITATIONAL PHYSIOLOGY 15(1):191-192
- 22 *MONICI M, BASILE B, CIALDAI F, ROMANO G, FUSI F, CONTI A (2008)*
Irradiation by pulsed Nd:YAG laser induces the production of extracellular matrix molecules by cells of the connective tissues. A tool for tissue repair
PROC. OF SPIE 6991, Biophotonics: Photonic Solutions for Better Health Care, 69912K
- 23 *BASILE B, ROMANO G, FUSI F, MONICI M (2008)*
Comparison Between the Effects of Hypergravity and Photomechanical Stress on Cells Producing ECM
MICROGRAVITY SCIENCE AND TECHNOLOGY 21(1-2): 151-157
- 24 *CONTE PG, SANTAMATO A, FIORE P, LOPRESTO A, MAZZARACCHIO M (2008)*
Treatment of chronic low back pain: back scholl versus Hilterapia.
ENERGY FOR HEALTH 3:10-13
- 25 *VILIANI T, RICCI E, MANGONE G, GRAZIANI C, PASQUETTI P (2008)*
Effects of Hilterapia vs. Viscosupplementation in knee osteoarthritis patients a randomized controlled clinical trial.
ENERGY FOR HEALTH 3:14-17
- 26 *GLEISER J (2008)*
Hilterapia efficiency in handling the post surgical pain after the release of the carpal tunnel
ENERGY FOR HEALTH 3:18-21
- 27 *VALENT A (2008)*
Muscle lesion in athletes: case comparison between Hilterapia and traditional therapy.
ENERGY FOR HEALTH 3:22-25

Effects of pulsed Nd:YAG laser at molecular and cellular level
A study on the basis of Hilterapia
ENERGY FOR HEALTH 3:26-33

- 29 *BODINI G, CROCE AM (2008)*
Treatment of proprioceptive balance disorders: comparison between kinesiotherapy and Hilterapia
ENERGY FOR HEALTH 3:6-9
- 30 *SAGGINI R (2007)*
Percorso riabilitativo complesso nella sindrome della "spalla dolorosa" da rottura parziale e da tendinopatia calcifica della cuffia dei rotatori (Complex rehabilitation path of "painful shoulder" syndrome due to partial tear and calcific tendinopathy of the rotator cuff).
SPHERA MEDICAL JOURNAL 6:16-19
- 31 *BODINI G, CROCE AM (2007)*
La sindrome del tunnel carpale: trattamento con HILT-Terapia (Carpal tunnel syndrome: treatment with HILT Therapy)
SPHERA MEDICAL JOURNAL 5:16-20
- 32 *ZATI A, FORTUNA D, VALENT A, PULVIRENTI F, BILOTTA TW (2004)*
Treatment of low back pain caused by intervertebral disk displacement: comparison between high power laser, TENS and NSAIDs
MED. SPORT 57(1):77-82
- 33 *ZATI A, CARDILLO I, FORTUNA D, BILOTTA TW (2003)*
Conservative treatment of low back pain caused by intervertebral disk displacement: comparison among Nd:YAG laser therapy, TENS and NSAIDs
LASER IN MEDICAL SCIENCE 18 (2): S25
- 34 *TARANTINO C, ROSSI G, FLAMINI G, FORTUNA D (2002)*
Cytoproliferative activity of the HILT: in vitro survey
LASER IN MEDICAL SCIENCE 17(4):A22
- 35 *FORTUNA D, ROSSI G, PAOLINI C, MAGI A, LOSANI F, FALLACI S, PACINI F, PORCIANI C, SANDLER A, DALLA TORRE R, PINNA S, VENTURINI A (2002)*
The Nd:YAG pulsed wave laser as support therapy in the treatment of teno-desmopathies of athlete horses: a clinical and an experimental trial
PROCEEDINGS OF SPIE 4903:105-118
- 36 *FORTUNA D, ROSSI G, BILOTTA TW, ZATI A, CARDILLO I, VENTURINI A, PINNA S, SERRA C, MASOTTI L (2002)*
Nd:YAG laser in experimentally induced chronic degenerative osteoarthritis in heavyline chicken broiler - pilot study
PROCEEDINGS OF SPIE 4903:77-84
- 37 *FORTUNA D, ROSSI G, BILOTTA TW, ZATI A, GAZZOTTI V, VENTURINI A, PINNA S, SERRA C, MASOTTI L (2002)*
High Intensity Laser Therapy in experimentally induced chronic degenerative tenosynovitis in heavyline chicken broiler
PROCEEDINGS OF SPIE 4903:85-91
- 38 *VALENT A*
Clinical results in treatment of gonarthrosis with HILT therapy
Proc. 2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007 pp. 99-103
- 39 *CARRARA R*
Comparison between II generation cyclo-oxygenases and HILT in the treatment of backache
Proc. 2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007 pp. 97-98
- 40 *CONTE PG, LELLI G, LOPRESTO A, MAZZARACCHIO M*
Treatment of chronic lumbosciatalgy: back school versus Nd:YAG laser
Proc. 2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007 pp. 67-71
- 41 *FINOCCHIARO S*
HILT therapy. An approach in the treatment of lumbosciatalgy
Proc. 2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007 pp. 42-51
- 42 *BUDA R, DI CAPRIO F, GHERMANDI R, BUDA M*
HILT in the treatment of patellar tendinopathy in sportsmen
Proc. 2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007 pp. 24-32
- 43 *SANTAMATO A, RANIERI M, IANIERI G, FIORE P, MEGNA G*
HILTtherapy in the pain of bicipital long caput and /or subacromial conflict
Proc. 2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007 pp. 3-16
- 44 *SAGGINI R, BELLOMO RG, BALDASSARRE V*
Therapeutic approach with HILT-therapy in the pathology of the shoulder with tenosynovitis of the omerral biceps.
Proc. 1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006 pp.78-87
- 45 *BUDA R, BUDA M, GIGOLO B, DI CAPRIO F, GHERMANDI R, ZATI A*
The Nd:YAG laser in the treatment of the osteocartilaginous lesions of the knee
Proc. 1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006 pp. 92-97
- 46 *DI CAPRIO F, GHERMANDI R, GRANDI G, BUDA M, BUDA R*
The Nd:YAG laser in the treatment of the lateral ligamental lesions of the ankle.
Proc. 1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006 pp.48-52
- 47 *MELEGATI G*
HILT treatment in calcific tendinopathy of the shoulder. A controlled perspective study
Proc. 1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006 pp.88-91
- 48 *GANZIT GP, GURIN E*
HILT treatment in epicondylitis
Proc. 1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006 pp.53-62

AUTHORS: Viliani T, Martini C, Mangone G, Pasquetti P

INSTITUTIONS:

Agency for Recovery and Rehabilitation, AOU Careggi, Florence, Italy

YEAR: 2010

High intensity laser therapy in knee osteoarthritis: comparison between two different pulsed-laser treatment protocols

JOURNAL: Energy for Health; 5:26-29

ABSTRACT: High Intensity Laser Therapy seems to be very effective in pain and function control in patients with KO, due to its high intensity and to the depth reached by the laser ray, but the optimal dose is not known yet. A previous research found a comparable efficacy to viscosupplementation in knee osteoarthritis II – III Kellgren stage, using the antalgic –antiphlogistic protocol (10 treatment sessions of pulsed high power laser, Nd:YAG).

The aim of this study was to compare the efficacy of two different HILT protocols to viscosupplementation in patients with symptomatic KO. 58 out-patients with symptomatic KO (IIIII Kellgren-Lowrence Scale stage) were enrolled and evaluated by WOMAC Scales, before treatment (t0), after treatment (t1) and after 4 months (t2). After randomization, the treatment consisted in viscosupplementation (4 Hyaluronic acid infiltrations 1/week) for Group A, HILT antalgic treatment (10 sessions, three times a week for Group B, 5 sessions three times a week for Group C). All the three groups showed a highly statistically significant improvement between t0 and t1 in WOMAC Scales, which was maintained at follow-up (t2). No side effect was found, neither in Group A nor in Group B, nor in Group C. HILT treatment showed analogous results to viscosupplementation. HILT seems a good medical instrument for pain control and for the improvement of patient's quality of life, with dose-related effects.

AUTHORS: Santamato A¹, Solfrizzi V², Panza F², Tondi G³, Frisardi V², Leggin BG⁴, Ranieri M³, Fiore P¹

INSTITUTIONS:

¹Department of Physical Medicine and Rehabilitation, University of Foggia, Italy

²Memory Unit, Center for Aging Brain, Department of Geriatrics, University of Bari, Bari, Italy

³Department of Neurological and Psychiatric Sciences, University of Bari, Bari, Italy

⁴Penn Presbyterian Medical Center, Philadelphia, Pennsylvania

YEAR: 2009

Short-term Effects of High-Intensity Laser Therapy Versus Ultrasound Therapy in the Treatment of People With Subacromial Impingement Syndrome: A Randomized Clinical Trial

JOURNAL: Physical Therapy; 89(7):643-652

BACKGROUND: Subacromial impingement syndrome (SAIS) is a painful condition resulting from the entrapment of anatomical structures between the anteroinferior corner of the acromion and the greater tuberosity of the humerus.

OBJECTIVE: The aim of this study was to evaluate the short-term effectiveness of high-intensity laser therapy (HILT) versus ultrasound (US) therapy in the treatment of SAIS.

DESIGN: The study was designed as a randomized clinical trial.

SETTING: The study was conducted in a university hospital.

PATIENTS: Seventy patients with SAIS were randomly assigned to a HILT group or a US therapy group.

INTERVENTION: Study participants received 10 treatment sessions of HILT or US therapy over a period of 2 consecutive weeks.

Measurements. Outcome measures were the Constant-Murley Scale (CMS), a visual analog scale (VAS), and the Simple Shoulder Test (SST).

RESULTS: For the 70 study participants (42 women and 28 men; mean [SD] age_54.1 years [9.0]; mean [SD] VAS score at baseline_6.4 [1.7]), there were no between-group differences at baseline in VAS, CMS, and SST scores. At the end of the 2-week intervention, participants in the HILT group showed a significantly greater decrease in pain than participants in the US therapy group. Statistically significant differences in change in pain, articular movement, functionality, and muscle strength (force-generating capacity) (VAS, CMS, and SST scores) were observed after 10 treatment sessions from the baseline for participants in the HILT group compared with participants in the US therapy group. In particular, only the difference in change of VAS score between groups (1.65 points) surpassed the accepted minimal clinically important difference for this tool.

LIMITATIONS: This study was limited by sample size, lack of a control or placebo group, and follow-up period.

CONCLUSIONS: Participants diagnosed with SAIS showed greater reduction in pain and improvement in articular movement functionality and muscle strength of the affected shoulder after 10 treatment sessions of HILT than did participants receiving US therapy over a period of 2 consecutive weeks.

AUTHORS: Sabbahi S

INSTITUTIONS:

Physical Therapy Department, King Faisal Specialist Hospital & Research Center at Riyadh, Kingdom of Saudi Arabia

YEAR: 2009

Clinical experience using Hilterapia® in “knee arthrosis”

JOURNAL: Energy for Health; 4:24-27

ABSTRACT: The aim of this study is to compare the efficacy of High Intensity Laser Therapy “HILT” against Low Level Laser Therapy “LLLT” and therapeutic ultrasound “US”, in combination with exercises, in relieving knee pain, increasing walking distance without pain and squatting in patients with knee early osteoarthritis (OA). Thirty subjects with knee early OA, males and females, age between 40 and 72 years, were enrolled. Participants were randomly and equally classified into three groups. All participants received exercise program for knee in combination with one of the therapeutic modalities compared (HILT, LLLT, US). All participants received six treatments for three weeks (two sessions/ week).

The results show that HILT is significantly more effective than LLLT and therapeutic US in inhibiting pain, increasing walking distance without pain and improving the ability to squat in people with knee early OA. No differences between LLLT and therapeutic US effectiveness in the treatment of early OA have been found.

AUTHORS: Monici M¹, Romano G², Cialdai F², Fusi F², Marziliano N³, Benvenuti S², Cellai I², Egli M⁴, Cogoli A⁵

INSTITUTIONS:

¹ASAcampus, ASA Research Division, Dept. of Clinical Physiopathology, University of Florence, Florence, Italy

²Dept. of Clinical Physiopathology, University of Florence, Florence, Italy

³IRCCF, San Matteo Hospital, Pavia, Italy

⁴Space Biology Group, ETH-Technopark, Zurich, Switzerland

⁵Zero-g LifeTec GmbH, ETH-Technopark, Zurich, Switzerland

YEAR: 2008

Gravitational/mechanical factors affect gene expression profile and phenotypic specification of human mesenchymal stem cells

JOURNAL: Journal of Gravitational Physiology; 15(1):191-192

ABSTRACT: Stem cell implantation is a promising approach for tissue repair. Unfortunately this possibility is strictly limited because these cells early withdraw from the cell cycle and seem to form passive, rather than active grafts. Therefore, the development of strategies capable of increasing the yield of phenotypic specification would be a primary aim in biomedical research. It is known that both biochemical and physical factors are needed for tissue homeostasis and their combination in a dose- and time-dependent manner is probably the key to in vitro and in vivo tissue regeneration. In this study, the effects of gravitational factors on human mesenchymal stem cell differentiation were investigated and compared with the ones caused by mechanical stress.

The results showed that gene expression profile and phenotypic specification change according with the gravitational/mechanical stress to which the hMSCs were exposed. Loading by hyperfuge and photomechanical stress by pulsed Nd:YAG laser induced osteoblastogenesis and chondrogenesis while microgravity favoured adipogenesis.

AUTHORS: Monici M¹, Basile B², Cialdai F², Romano G², Fusi F², Conti A²

INSTITUTIONS:

¹ASAcampus, ASA Research Division, Dept. of Clinical Physiopathology, University of Florence, Florence, Italy

²Dept. of Clinical Physiopathology, University of Florence, Florence, Italy

YEAR: 2008

Irradiation by pulsed Nd:YAG laser induces the production of extracellular matrix molecules by cells of the connective tissues. A tool for tissue repair

JOURNAL: Proceedings of SPIE; 6991, Biophotonics: Photonic Solutions for Better Health Care, 69912K

ABSTRACT: Many studies demonstrated that mechanical stress is a key factor for tissue homeostasis, while unloading induce loss of mass and impairment of function. Because of their physiological function, muscle, connective tissue, bone and cartilage dynamically interact with mechanical and gravitational stress, modifying their properties through the continuous modification of their composition. Indeed, it is known that mechanical stress increases the production of extracellular matrix (ECM) components by cells, but the mechanotransduction mechanisms and the optimal loading conditions required for an optimal tissue homeostasis are still unknown. Considering the importance of cell activation and ECM production in tissue regeneration, a proper use of mechanical stimulation could be a powerful tool in tissue repair and tissue engineering.

Studies exploring advanced modalities for supplying mechanical stimuli are needed to increase our knowledge on mechanobiology and to develop effective clinical applications.

Here we describe the effect of photomechanical stress, supplied by a pulsed Nd:YAG laser on ECM production by cells of connective tissues.

Cell morphology, production of ECM molecules (collagens, fibronectin, mucopolysaccharides), cell adhesion and cell energy metabolism have been studied by using immunofluorescence and autofluorescence microscopy. The results show that photomechanical stress induces cytoskeleton remodelling, redistribution of membrane integrins, increase in production of ECM molecules. These results could be of consequence for developing clinical protocols for the treatment of connective tissue diseases by pulsed Nd:YAG laser.

AUTHORS: Basile B¹, Romano G¹, Fusi F¹, Monici M²

INSTITUTIONS:

¹Dept. of Clinical Physiopathology, University of Florence, Florence, Italy

²ASAcampus, ASA Research Division, Dept. of Clinical Physiopathology, University of Florence, Florence, Italy

YEAR: 2008

Comparison Between the Effects of Hypergravity and Photomechanical Stress on Cells Producing ECM

JOURNAL: Microgravity Science and Technology; 21(1-2): 151-157

ABSTRACT: In the body, connective tissues have a major function in sustaining mechanical stresses. On the other hand, mechanical forces are important factors for connective tissue homeostasis. Connective tissues dynamically interact with mechanical and gravitational stimuli, changing their mechanical properties through the continuous modification of their composition, and thus improving their function. In connective tissues, mechanical forces are major regulators of extracellular matrix turnover, strongly affecting the production of extracellular matrix proteins.

On the contrary, unloading conditions, such as bed rest or space flight, have a negative effect on these tissues, with loss of mass and impairment of mechanical properties. Here we describe the effect of photomechanical stress, supplied by a pulsed Nd:YAG laser, on extracellular matrix production by fibroblasts and chondrocytes, and compare it with the effect produced by hypergravity conditions.

Cell morphology and structure, extracellular matrix production, cell adhesion, cell energy metabolism have been studied in treated human fibroblasts and chondrocytes by using immunocytochemistry, fluorescence and autofluorescence microscopy.

The results show that photomechanical stress induce cytoskeleton remodelling, redistribution of membrane integrins, increase in production of ECM molecules, changes in cell energy metabolism. The effects are similar to those observed in the same cells exposed to cyclic hypergravitational stress ($10 \times g$).

AUTHORS: Conte PG¹, Santamato A², Fiore P², Lopresto A¹, Mazzaracchio M¹

INSTITUTIONS:

¹S.C. Rehabilitation, SS Annunziata Hospital– ASL Ta\1

²O.U. and S.C. Physical Medicine and Rehabilitation, University of Foggia, Italy

YEAR: 2008

Treatment of chronic low back pain: back scholl versus Hilterapia®

JOURNAL: Energy for Health; 3:10-13

ABSTRACT: Chronic low back pain can be treated with the use of back school, drugs, physical therapy with therapeutic medical equipment, psychological therapy, life style improvement and surgery. The aim of this study was to compare the efficacy of back school treatment with a combination of back school and treatment by pulsed Nd:YAG laser (Hilterapia®). Patients have been divided in two groups similar for age and sex: the first group was treated exclusively with back school exercises; conversely, the second group received a combined therapy of back school and Hilterapia®. Results obtained with the two therapy regimens have been evaluated measuring pain control and disability. Although an improvement has been observed in both groups, this was more evident in patients treated with the combined therapy.

AUTHORS: Viliani T, Ricci E, Mangone G, Graziani C, Pasquetti P

INSTITUTIONS:

Recovery and Rehabilitation Agency, AOU Careggi, Firenze, Italy

YEAR: 2008

Effects of Hilterapia® vs. Viscosupplementation in knee osteoarthritis patients a randomized controlled clinical trial

JOURNAL: Energy for Health; 3:14-17

Abstract: Therapeutic approach in Knee Osteoarthritis (KO), a long lasting disease with both epidemiological and social implications, may consider local interventions which are useful along the course of the pathology. Viscosupplementation has got efficacy with little side effects. Laser therapy (Low Level Laser Therapy-LLLT-) is widely used but we don't still have sure demonstrations on its efficacy. High Intensity Laser Therapy (HILT, Hilterapia®) seems to be more effective than LLLT, due to its higher intensity and to the depth reached by the laser ray.

The aim of this study was to compare the efficacy of Hilterapia® to viscosupplementation in patients with symptomatic KO. 41 out-patients with symptomatic KO (IIIII Kellgren-Lowrence Scale stage) were enrolled and evaluated by WOMAC and Lequesne Scales, before treatment (t0), after treatment (t1) and after 4 months (t2). After randomization, the treatment consisted in viscosupplementation (4 Hyaluronic acid infiltrations 1/week) for Group A, or Hilterapia® (antalgic treatment, 10 sessions, three time a week) for Group B.

Both the groups (A and B) showed a highly statistically significant improvement between t0 and t1 in WOMAC and Lequesne Scales. The improvement was maintained at follow up (t2) either by Group A or Group B. No side effect was found, neither in Group A nor in Group B.

Hilterapia® showed analogous results to viscosupplementation. We conclude that Hilterapia® seems a good medical instrument for pain control and for improvement of patient's quality of life.

AUTHORS: Gleiser J

INSTITUTIONS:

Aleve Clinic, Bogota, Colombia

YEAR: 2008

Hilterapia® efficiency in handling the post surgical pain after the release of the carpal tunnel. Descriptive observational study

JOURNAL: Energy for Health; 3:18-21

ABSTRACT: A descriptive observational study was made to evaluate the efficiency of a new option of treatment, the high power laser therapy (Hilterapia®) in handling a frequent pathology as the pain in the palm of the hand after the open release of the carpal tunnel (pillar pin). Pilla pain is a painful condition present in early stages in up to 41% of the patients after the transverse ligament release. This percentage diminishes with time, but has not yet had a therapeutic, efficient and non invasive treatment.

Thirteen patients were evaluated after being operated by three different surgeons with a standard open carpal release technique. After six months of surgery, they still presented a persistent and incapacitating pain that could be attributed to a pillar pain. All patients were summated to eight sessions of Hilterapia® treatment with the HIRO 3 equipment (ASA S.r.l., Vicenza, Italy). The energy applied in the painful area of the hand was 600 Joules. Two different parameters were evaluated: pain scale and grip strength, both affected by the pathology of pillar pain. The study shows a tendency to diminish the pain and to improve the grip strength and the hand functioning. This can be attributed to the use of Hilterapia®, which opens a therapeutic way to its use in this type of condition.

AUTHORS: Valent A

INSTITUTIONS:

Riacef Private Outpatient Clinic of Modena

YEAR: 2008

Muscle lesion in athletes: case comparison between Hilterapia® and traditional therapy

JOURNAL: Energy for Health; 3:22-25

ABSTRACT: Muscle pathologies during sport activities are very frequent. The most serious event is the muscle strain that needs specific treatment based upon functional rehabilitation associated with physiotherapeutic medical equipments. This clinical study compared the results obtained in two groups of 15 patients, homogeneous for pathology (1st degree strain), sex and age, treated with either Hilterapia® or with traditional therapy (CO₂ laser therapy and ultrasound therapy).

Results have been evaluated by using VAS pain score, ultrasound scan, number of therapy sessions, time before sport activity can be resumed and satisfaction index of patients. Based on this study, Hilterapia® proved to be effective in reducing pain and time before sport activity can be resumed, with statistically better results when compared to conventional therapy, according to all evaluation parameters.

AUTHORS: Monici M¹, Cialdai F², Fusi F², Romano G², Pratesi R³

INSTITUTIONS:

¹ASAcampus-ASA Research Division, Dept. of Clinical Physiopathology, University of Florence, Italy

²Dept. of Clinical Physiopathology, University of Florence, Florence, Italy

³Dept. of Physics, University of Florence, Sesto F.no, Florence, Italy

YEAR: 2008

Effects of pulsed Nd:YAG laser at molecular and cellular level. A study on the basis of Hilterapia®

JOURNAL: Energy for Health; 3:26-33

ABSTRACT: Lasers have been widely applied in many different fields of medicine, proving their effectiveness in the treatment of a wide range of diseases. In spite of the great amount of literature, it is difficult to understand the molecular and cellular mechanisms at the basis of the systemic effects induced by laser irradiation because of different kinds of laser used, operative conditions, variety of biological targets and responses. The application of high power lasers in physiotherapy is quite recent. It is due to the development of instruments which allow the control of photothermal and photomechanical processes so as to obtain therapeutic effects without tissue damage. In particular, pulsed Nd:YAG laser has proved its versatility and efficacy in the treatment of many different musculoskeletal diseases and it is believed to have anti-inflammatory, anti-oedema, analgesic and also reparative effects.

The aim of the studies here presented was to contribute in understanding the molecular mechanisms and cellular processes at the basis of the systemic effects produced by pulsed Nd:YAG laser irradiation. Owing to the lack of chromophores efficiently absorbing Nd:YAG radiation (wavelength 1064 nm) in cells and tissues, we hypothesized that, rather than photochemical processes, aspecific mechanisms probably due to combined photothermal and photomechanical interactions could be responsible for the above mentioned effects of pulsed Nd:YAG laser.

The finding suggest that cells “sense” pulsed ND:YAG laser irradiation and respond to it through mechanotransduction machinery. We hypothesize that the interaction between tissue and laser radiation alters the mechanics of cell microenvironment, thus acting on the cells as a mechanical stress.

AUTHORS: Bodini G, Croce AM

INSTITUTIONS:

Physical Medicine and Rehabilitation O.U., S.Camillo Nursing Home, Brescia, Italy

YEAR: 2008

**Treatment of proprioceptive balance disorders:
comparison between kinesiotherapy and Hilterapia®**

JOURNAL: Energy for Health; 3:6-9

ABSTRACT: Proprioceptive vertigo disorders can be caused by several mechanisms, generally of muscle-tendon origin, able to induce an irritant stimulus on vestibular nuclei and on cervical sympathetic nervous system. Such disorders are often associated with pain and functional limitation of the cervical tract. Thirty subjects, subdivided in two groups, have been included in the study. One group was treated with kinesiotherapy alone and the other group with kinesiotherapy combined with Hilterapia®. Treatment has been administered on a daily basis for the first week and every other day for the following 2 weeks, for a total of 10 sessions.

All subjects have undergone a clinical-anamnestic evaluation before treatment (T0), at the end of the first week (T1), at the end of the therapy (T2), and one month later (T3). A computerized stabilometric test, with elaboration of the cervical interference index has also been taken at T0, T2 and T3 time points. Data on semi quantitative scale have been analysed using the Mann-Whitney non parametric test. Data on cervical interference have been analysed using the parametric Paired Samples T Test. With regards to the non parametric data, no significant variations between the two groups have emerged. However, both sets of data showed significant variations in the trend over time of the various parameters, within each group, with a more rapid improvement, in terms of pain and functional limitation, in those subjects undergoing a combined kinesiotherapy and Hilterapia® treatment. With respect to the cervical interference index, a significant variation between T0 and T3 has been observed only in the combined treatment group.

Hilterapia® has been found to be an effective help to produce faster subjective improvements with kinesiotherapy and more importantly, it has been demonstrated to improve proprioceptive balance disorders.

AUTHORS: Saggini R

INSTITUTIONS:

University G. D'Annunzio, Chieti, Italy

YEAR: 2007

Percorso riabilitativo complesso nella sindrome della “spalla dolorosa” da rottura parziale e da tendinopatia calcifica della cuffia dei rotatori

(Complex rehabilitation path of “painful shoulder” syndrome due to partial tear and calcific tendinopathy of the rotator cuff)

JOURNAL: Sphera Medical Journal; 6:16-19

ABSTRACT: The aim of our study was to estimate the persistence of the results obtained with a complex rehabilitative approach in the treatment of partial lesions and calcific tendinopathy of the cup of the rotator muscles.

We proposed to evaluate the therapeutic impact of a complex rehabilitative approach consisting in administrating physical energy through Hilt therapy and high-energy shockwaves with an electrohydraulic device jointly with a protocol of joint-specific motor rehabilitation, in order to make medium- and long-term comparisons. 40 patients were enrolled in the study. They were affected by partial lesion of the cup rotator muscles (I or II degree) or by shoulder calcific tendonitis; the patients were clinically controlled for 360 days after the first treatment.

This study proved that it is possible to codify a routine approach in the therapy of incomplete lesions of the cup of the rotator muscles by the use of different physical energies, through Hilt therapy and high-energy electrohydraulic shock waves with rapid rise, because they allow to obtain significant improvement in subjective and objective conditions related to a painful and dysfunctional state of the shoulder, together with rehabilitative training in the presence of a qualified physiotherapist.

AUTHORS: Bodini G, Croce AM

INSTITUTIONS:

Specialistic Rehabilitation Hospital Unit, "San Camillo" Care Facility, Brescia, Italy

YEAR: 2007

La sindrome del tunnel carpale: trattamento con HILT Terapia

(Carpal tunnel syndrome: treatment with HILT Therapy)

JOURNAL: Sphera Medical Journal; 5:16-20

ABSTRACT: The aim of the present study is to assess the effectiveness of HILT laser treatment for carpal tunnel syndromes. It's a very widespread pathology that has many different etiologies. Its typical symptoms are the ones of the entrapment of the median nerve at the wrist, that is to say paresthesias and pain at wrist and hand. Diagnosis is based on the clinical framework, but above all on the finding of alterations of the nerve conduction, assessed through EMG.

At the present time, treatment is based on general and local medical therapy, on physical therapy and on the surgical decompression of the nerve. As far as physical therapy is concerned, there is scarce evidence about its effectiveness.

In the present study, 25 patients affected by mild or medium-level carpal tunnel syndrome underwent HILT laser treatment and were assessed through clinical, echographic, and EMG tests. Assessment was performed before and after treatment, and 3 months after its end.

The study shows that this physiotherapy method has a good effectiveness in the treatment of carpal tunnel syndrome.

AUTHORS: Zati A¹, Fortuna D², Valent A¹, Pulvirenti F¹, Bilotta TW¹

INSTITUTIONS:

¹Rizzoli Institute for Orthopedics, Bologna, Italy

²Cardio-Thoracic Department, University of Pisa, Pisa, Italy

YEAR: 2004

Treatment of low back pain caused by intervertebral disk displacement: comparison between high power laser, TENS and NSAIDs

JOURNAL: Medicina dello Sport; 57(1): 77-82

ABSTRACT: Low back pain is a very frequent symptom in patients affected by herniated intervertebral disk.

In the majority of cases the symptomatology resolves spontaneously in some months. For this reason a conservative management is preferable to a surgical solution. There are many therapeutic possibilities but only a few, NSAIDs and TENS, have demonstrated their real efficacy.

In physiotherapy, high power laser therapy is in increasing use to treat pain due to several orthopedic diseases. In this clinical study, we have tried to assess the efficacy of high power laser therapy in low back pain caused by intervertebral disk herniation, by comparing a new laser (pulsed Nd:YAG) with the TENS and a well-known NSAIDs (Ketoprofen). This trial highlights a better result of the high power laser therapy with respect to those obtained from TENS and NSAIDs. The most striking results are represented by the longer duration of the laser effects. It is therefore to be hoped that further research will be carried out in this field.

AUTHORS: Zati A¹, Cardillo I², Fortuna D³, Bilotta TW¹

INSTITUTIONS:

¹Rizzoli Institute for Orthopedics, Bologna, Italy

²Scientific and Technical Committee, ELen Group, Calenzano (FI), Italy

³Cardio-Thoracic Department, University of Pisa, Pisa, Italy

YEAR: 2004

Conservative treatment of low back pain caused by intervertebral disk displacement: comparison among Nd:YAG laser therapy, TENS and NSAIDs

JOURNAL: Laser in Medical Science; 18(2): S25

BACKGROUND: low back pain with nerve root involvement is a very frequent symptom in patients affected by herniated intervertebral disk (1,2). In many cases symptoms resolve spontaneously in 12 months (4,5). For this reason conservative management is preferred to surgery (6). There are many methods of treatment but few, NSAIDs (12,13,14) TENS (transcutaneous electrical nerve stimulation) (15,16) have proven to be efficacious. Positive results regarding the employment of power laser in laser therapy (17,18,19,20,21,22) have led us to assess the efficacy of the laser in the treatment of this disease.

OBJECTIVE: to compare the efficacy of Nd:YAG pulsed wave (pw) laser, TENS and NSAIDs in the symptomatic treatment of intervertebral disk displacement.

MATERIALS AND METHODS: 60 patients with L4-L5 or L5-S1 intervertebral disk displacement affected by subacute back pain with nerve root involvement were divided into 3 groups. Each group underwent one of the following types of treatment for 15 days: NSAIDs (Ketoprofene), TENS or Nd:YAG laser. The assessment of the pain was carried out using two scales: Backill and VAS. Follow-up examinations were carried out 15 (T/1), 45 (T/2), and 180 (T/3) days from the beginning of treatment.

RESULTS: at the end of the therapeutic cycle (T/I) all three methods were efficacious. Instead, at the subsequent follow-ups there was a different trend among laser treatment and the other methods. In fact, the positive effect of laser lasted into T/3 (180 days) while the score of patients treated by NSAIDs and TENS returned to initial values.

CONCLUSIONS: this trial highlights the superior results of laser therapy compared to those obtained by TENS and NSAIDs in the treatment of low back pain in patients affected by herniated intervertebral disk. The most striking results are represented by the longer duration of the laser effects. Despite its unclear biological effect, the High Power Laser Therapy (HILT) appears to be a interesting new treatment, worthy of further research.

AUTHORS: Tarantino C¹, Rossi G², Flamini G³, Fortuna D⁴

INSTITUTIONS:

¹Department of Animal Pathology, University of Pisa, Italy

²Department of Veterinary Science, University of Camerino, Italy

³Department of Bio-organic and Bio-Pharmacy, University of Pisa, Italy

⁴Cardio-Thoracic Department, University of Pisa, Italy

YEAR: 2002

Cytoproliferative activity of the HILT: in vitro survey

JOURNAL: Laser in Medical Science; 17(4):A22

ABSTRACT: nowadays Nd:YAG is used efficaciously in anti-inflammatory and pain therapies. The aim of this study is mainly to assess the possibility of its use also in reparative therapy, and for this reason we have assayed the cytoproliferative effect. Only one study exists in the bibliography that demonstrates the capacity of Nd:YAG laser to increase the mitotic index. The majority of the works only indicate for this laser the parameters inhibiting cellular proliferation. The objective of this study is that of determining the parameters of a pulsed Nd:YAG laser (PW: pulsed wave) capable of inducing the increase in the mitotic index on two cellular lines: the continuous line of "VERO" kidney and the human HCT-8 ileocecal adenocarcinoma. Following we carried out cytometabolic assessments. For this purpose cellular cultures of HCT-8 cells were exposed to single 7.69 J/cm² (12 sec) doses of irradiation. The assessment of the cellular proliferation was carried out by means of spectrophotometry, immunohistochemical tests (IHC) and direct counts. The values that resulted in increasing the cellular proliferation of the HCT-8 line were then applied to the VERO line in order to verify its efficacy. The average values, obtained from the 450 nm spectrophotometric readings of the wells treated with doses of 2.7 Watt and 15 Hz for 12", indicated an increase in the optical density equal to 0.0075 O.D. in the treated cells compared to the controls (greater cell density and thickness of the monolayer). This proliferative increase was also observed immunohistochemically as a mean increase for the microscopic field (400X) of nuclei expressing the antigens Ki67 and PCNA in the treated cells compared to the controls, together with a greater expression of Insulin Like Growth Factor 1 (ILGF-1) and Cyclin D1. The variation in these parameters did not provide any significant increases. The application of these parameters to the VERO cells did not induce constant values in relation to the proliferative response. Lastly, by treating the monolayer with 50µl dose of 400 µMol solution of the isoflavone, genisteine, which resulted in having an oncosuppression effect on several neoplastic cellular lines, blocking the tyrosin-kinase metabolic path, there was an arrest in the cellular cycle of the HCT-8 cells, by-passable via an additional exposition of the monolayer to irradiation with Nd:YAG PW. The results indicate that irradiation with Nd:YAG 1064 nm PW induces the proliferation of HCT-8 cells in vitro with specific parameters, and there is a direct specificity between the dosimeter and the cellular line; in fact the same parameters that stimulate the HCT-8 line are not as effective in favouring the multiplication of the VERO line.

AUTHORS: Fortuna D¹, Rossi G², Paolini C³, Magi A⁴, Losani F⁴, Fallaci S⁴, Pacini F⁴, Porciani C⁴, Sandler A⁴, Dalla Torre R⁴, Pinna S⁵, Venturini A⁵

INSTITUTIONS:

¹Department of Cardio - Thoracic Medicine, University of Pisa, Italy

²Department of Animal Science, University of Camerino, Italy

³DEKA MELA s.r.l. Calenzano, Firenze, Italy

⁴Practitioner

⁵Department of Veterinarian Clinic, Section of Surgery, University of Bologna, Italy

YEAR: 2002

The Nd:YAG pulsed wave laser as support therapy in the treatment of teno-desmopathies of athlete horses: a clinical and an experimental trial

JOURNAL: Proceedings of SPIE; 4903:105-118

ABSTRACT: the ultrasonographic evolution of tendinous repair envisages the recovery of ecogenicity: “reparative phase”, followed by the realignment of the collagen fibres: “rehabilitative phase”. The primary objective was to verify the safety and efficacy of Nd:YAG pulsed wave on teno-desmopathies of horses. Secondary to shorten “reparative phase” for to provide more time far “rehabilitative phase”. The study has been divided into two investigations: experimental and clinical. In the experimental investigation, on 3 meat horses, the safety and tolerance of a power laser (35 W/cm², 25 J/cm²) was investigated. The clinical investigation was performed on 79 sport horses through randomized double-blind. All subjects (Controls and Treated) received, on the subskin above the tendon lesion, the same local infiltration of immunostimulant.

The results indicates that the High Intensity Laser Therapy (HILT) is safe and tollerated. It is able of reducing, in significative way, the “reparative phase”, with a lower percentage of relapse (29% Treated and 40% Controls), but it is not able to reduce the time of the “rehabilitative phase”.

AUTHORS: Fortuna D¹, Rossi G², Bilotta TW³, Zati A³, Cardillo I³, Venturini A⁴, Pinna S⁴, Serra C⁵, Masotti L⁶

INSTITUTIONS:

¹Department of Cardio-Thoracic Medicine, University of Pisa, Italy

²Department of Animal Science, University of Camerino, Italy

³Rizzoli Orthopedics Institutes of Bologna, Italy

⁴Department of Veterinarian Clinic, Section of Surgery, University of Bologna, Italy

⁵Practitioner

⁶Department of Electronic and Telecommunications - University of Florence, Italy

YEAR: 2002

Nd:YAG laser in experimentally induced chronic degenerative osteoarthritis in chicken broiler - pilot study

JOURNAL: Proceedings of SPIE; 4903:77-84

ABSTRACT: The Low Level Laser Therapy (LLLT) has been widely tested in arthritis disorders, but there is still some disagreement in the results, therefore in this study we have investigated High Intensity Laser Therapy (HILT). The degenerative arthritis was induced in 18 chickens by intra-articular inoculation of Freund's complete adjuvant.

Clinical studies were carried out (weight increase and grades of lameness), as well as morphological (macroscopic and histological) tests and seroassay (C Reactive Protein).

The Nd:YAG pulsed wave was employed.

The serologic data revealed the anti-inflammatory effect of the laser, with a highly significant difference between those treated and the control group. No lesion on the skin, i.e. burn, or in depth has been observed in the Treated group.

Heavyline of broiler chickens in growing age has been revealed a good animal model of O.A.. The Nd:YAG Pulsed Wave it is safe on these structures. The anti-inflammatory effect of the HILT it seems to contrast the destructive degenerative process.

AUTHORS: Fortuna D¹, Rossi G¹, Bilotta TW³, Zati A³, Gazzotti V³, Venturini A⁴, Pinna S⁴, Serra C⁵, Masotti L⁶

INSTITUTIONS:

¹Department of Cardio-Thoracic Medicine, University of Pisa, Italy

²Department of Animal Science, University of Camerino, Italy

³Rizzoli Orthopedics Institutes of Bologna, Italy

⁴Department of Veterinarian Clinic, Section of Surgery, University of Bologna, Italy

⁵Practitioner

⁶Department of Electronic and Telecommunications - University of Florence, Italy

YEAR: 2002

High Intensity Laser Therapy during chronic degenerative tenosynovitis experimentally induced in chicken broiler

JOURNAL: Proceedings of SPIE; 4903:85-91

ABSTRACT: The aims of this study was the safety and the efficacy of High Intensity Laser Therapy (HILT) on chronic degenerative tenosynovitis.

We have effectuated the histological evaluation and seroassay (C reactive protein) on 18 chickens affected by chronic degenerative tenosynovitis experimentally induced.

We have been employed a Nd:YAG laser pulsed wave; all irradiated subjects received the same total energy (270 Joule) with a fluence of 7,7 J/cm² and intensity of 10,7 W /cm².

The histological findings revealed a distinct reduction of the mineralization of the “choral” matrix, the anti-inflammatory effect of the laser, the hyperplasia of the synoviocytes and ectasia of the lymphatic vessels.

AUTHORS: Valent A

INSTITUTIONS:

Doctor of Cimone Volley, Modena, Italy

Clinical results in treatment of gonarthrosis with HILT therapy

PROCEEDINGS:

2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007, pp. 99-103

PURPOSE: to evaluate the efficacy of HILT therapy in the treatment of gonarthrosis.

DISCUSSION/TOTAL TIME: In this study was recruited 15 patients, affected by gonarthrosis; the evaluation of both functionality and pain were evaluated before and after the treatment with HILT Therapy.

METHOD: each patient was treated for 14 days (5 sessions during the first week, 2 sessions during the second week). HILT therapy was performed by Hiro 3.0 laser (fluence= 1430-1780 mJ/cm², frequency= 20-30Hz; total energy= 3000J). Clinical evaluation of both functionality and pain were evaluated before and after the treatment with HILT therapy and was performed by V.A.S. scale, Womac form. Follow-up was 1 month.

RESULTS: after HILT therapy, 74% of patients showed an improvement of functionality and 66% of patients showed a decrease of pain.

CONCLUSION: these preliminary showed that HILT therapy can be successfully used in the treatment of gonarthrosis.

AUTHORS: Carrara R

INSTITUTIONS:

Consulting Room Milici, Catania, Italy

Comparison between II generation cyclo-oxygenases and HILT® in the treatment of backache

PROCEEDINGS:

2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007, pp. 97-98

PURPOSE: to evaluate the effects of HILT therapy in the treatment of human rachis affections.

DISCUSSION: the results obtained with HILT therapy were satisfactory and without collateral effects.

METHOD: 90 patients were divided in 4 groups; the different treatments were the following: 1) HILT therapy (10 sessions); 2) massage therapy (3 sessions/week); 3) cox2 therapy for 3 weeks (75mg and 90mg); 4) fisiokinesitherapy (20 days). The evaluation was based on clinical parameters and on the presence/absence of phlogistic processes.

RESULTS: 78% of patients treated with HILT therapy showed a decrease of painful symptomatology, while only 42% of patients treated with Cox2 therapy showed a clinical improvement. Patients treated with massage therapy and patients treated with fisiokinesitherapy showed an improvement in 75% and 62% of cases.

CONCLUSION: HILT therapy can be usefully applied for pain treatment in the backache, because it is able to reach deep tissues with safety and induce a prompt decrease of the symptoms without collateral effects..

AUTHORS: Conte PG, Lelli G, Lopresto A, Mazzaracchio M.

INSTITUTIONS:

Rehabilitation division, SS. Annunziata Hospital, Taranto, Italy

Treatment of chronic lumbosciatalgy: back school versus Nd:YAG laser

PROCEEDINGS:

2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007, pp. 67-71

PURPOSE: the aim of this study is to compare the efficacy of the treatment with back school versus the combined treatment back school and laser Nd:YAG.

DISCUSSION: the control group (7 subjects) was treated with back school only; the other group (7 subjects) was treated with back school followed laser Nd:YAG therapy. The latter was more effective, suggesting that Nd:YAG laser has a positive effect in treating lumbosciatalgy.

METHOD: The back school treatment was based on different physiotherapeutic exercises (e.g. stretching, Klapp posture...). The Nd:YAG laser was used at different fluences and modality, but with the same total energy (1500J). The evaluations of the results was performed by V.A.S. scale.

RESULTS: Both the groups of patients showed an improvement of the clinical parameters, but the subjects treated with both therapies showed a more evident improvement.

CONCLUSION: even if the number of studied patients is small, this study showed the potentiality of HILT therapy in the treatment of chronic lumbosciatalgy.

AUTHORS: Finocchiaro S

INSTITUTIONS:

Poliambulatorio della Misericordia, Pistoia, Italy

HILT therapy. An approach in the treatment of lumbosciatalgy

PROCEEDINGS:

2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007, pp. 42-51

PURPOSE: the aim of this work is to evaluate the efficacy of HILTherapy in the treatment of lumbosciatalgy.

DISCUSSION: in this study is demonstrated that Hilt therapy is efficacious not only to decrease of pain in lumbosciatalgy, but also because biostimulates tissues.

METHOD: 80 patients affected by lumbosciatalgy were included in this study and were divided in two group: one of the groups was treated with a protocol HILT through a CO₂ laser; the other one was treated with both CO₂ laser and Nd:YAG laser. The therapeutic cycle was based on 5 days of treatments for 2 weeks. Follow-up was until 60 days after the end of therapy. Patients were evaluated through V.A.S. scale.

RESULTS: patients treated with CO₂ laser showed a slow and progressive improvement, while with both laser treatments there was quick improvement.

CONCLUSION: The HILT therapy showed an early analgesic improvement, moreover this study suggest that HILT therapy induces a greater biostimulating effect.

AUTHORS: Buda R¹, Di Caprio F¹, Ghermandi R¹, Buda M²

INSTITUTIONS:

¹*Institutes Rizzoli, Bologna,*

²*Poliambulatorio Life, RSM*

HILT in the treatment of patellar tendinopathy in sportsman

PROCEEDINGS:

2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007, pp. 24-32

PURPOSE: to evaluate the effects of laser therapy HILT for rehabilitation of patellar tendinopathy

DISCUSSION: this study shows that the Hilt treatment is a valid therapeutic method for patellar tendinopathy.

RESEARCH METHOD: 20 patients were divided in two groups: in the former group there was 10 subjects treated with HILTherapy and in the latter there was 10 subjects treated with a CO₂ laser. HILT therapy was performed by a pulsed laser Nd:YAG (maximum fluence = 1780J, pulse energy < 120 µsec; spot = 5mm); CO₂ laser treatment consisted of 20W for 15 sec. . Patients were evaluated with clinical and echographic tests before, during and after the treatments.

RESULTS: patients of both groups showed an improvement of clinical and echographic parameters. Only two patients complained after HILT treatment.

CONCLUSION: Patients treated with HILTherapy showed an improvements of clinical parameters and produced a more quick recovery.

AUTHORS: Santamato A¹, Ranieri M², Ianieri G², Fiore P¹, Megna G²

INSTITUTIONS:

¹Operative Unit and Complex Structure of Rehabilitative Physical Medicine, University of Foggia, Foggia, Italy

²Operative Unit of Rehabilitative Physical Medicine, University of Bari, Bari, Italy

HILTherapy in the pain of bicipital long caput and /or subacromial conflict

PROCEEDINGS:

2nd HILTHERAPY NATIONAL CONGRESS, Fiera Milano, Milan, June 2007, pp. 3-16

PURPOSE: to evaluate the efficacy of HILT therapy in the pain of bicipital long caput and /or subacromial conflict.

DISCUSSION: it is suggested that the laser treatment can have anti-phlogistic and anti-edematous effects, then reduces painful symptomatology.

METHOD: 70 patients affected by tendinopathy were random divided in two groups: 35 subject treated with HILT therapy and 35 subjects treated with ultrasound, both for the 10 sessions. All patients were examined with physical tests, Costant Murley and V.A.S. scales.

RESULTS: subjects treated with HILT therapy showed a better clinical-functional improvement in comparison with subjects treated with ultrasound.

CONCLUSION: This study shows that the HILT therapy is a valid therapeutic method for shoulder tendinopathy

AUTHORS: Saggini R, Bellomo RG, Baldassarre V

INSTITUTIONS:

Medicine and Physics of Rehabilitation, University of Chieti, Italy

Therapeutic approach with HILT therapy in the pathology of the shoulder with tenosynovitis of the omal biceps

PROCEEDINGS:

1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006, pp.78-87

PURPOSE: evaluation of the effectiveness of HILT therapy in the treatment of the tenosynovitis of the omal biceps.

DISCUSSION: it is suggested that the laser treatment can have analgesic effect together with endorphyne increase, biostimulating effect, anti-inflammatory and anti-edematous effect.

METHOD: 30 patients were enrolled and divided in 2 groups. The former started the HILT treatment immediately after the enrollment, utilizing the latter group as control. At the end of the treatment for the former group, the latter started the therapy. Assessment was made by VAS, evaluation of joint mobility and muscle strength, echography. The treatment was made using a Nd:YAG laser.

RESULTS: Significant reduction or complete disappearance of the pain, reduction or complete disappearance of the edema of the tendineous sheath.

CONCLUSION: HILT therapy causes the quite complete reversion of the pain symptoms together with endorphyne increase and it causes a significative decrease in the edema of the tendineous sheath. Therefore it is an effective tool in the treatment of the tenosynovitis of the omal biceps.

AUTHORS: Buda R, Buda M, Gigolo B, Di Caprio F, Ghermandi R, Zati A

INSTITUTIONS:

Rizzoli Institute for Orthopaedics, Bologna, Italy

The Nd:YAG laser in the treatment of the osteocartilaginous lesions of the knee

PROCEEDINGS:

1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006, pp. 92-97

PURPOSE: evaluation of the effect of the treatment with Nd:YAG laser in the osteocartilaginous lesions of the knee.

DISCUSSION: The Nd:YAG laser induces the growth of jaline cartilage in the lesion foci in a different extent depending on the age of the patients and the position of the lesions

METHOD: 7 patients waiting for autologous transplantation of chondrocytes for osteo-chondral lesions of the femoral condyles have been considered. 5 patients have been treated with Nd:YAG laser in between the two arthroscopic procedures, while 2 patients have not been treated. Hystologic and immunohystochemical analyses have been performed on bioptic specimens.

RESULTS: In comparison with control, the laser treatment induced increase of grow factors in synovial fluids, decrease of inflammation factors and re-growth of jaline cartilage

CONCLUSION: The HILTherapy has anti-inflammatory and biostimulating effects, which have been demonstrated with histological and immunohystochemical tests, and induce the re-growth of cartilage.

AUTHORS: Di Caprio F, Ghermandi R, Grandi G, Buda M, Buda R

INSTITUTIONS:

Rizzoli Institute for Orthopaedics, Bologna, Italy

The Nd:YAG laser in the treatment of the lateral ligamental lesions of the ankle

PROCEEDINGS:

1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006, pp.48-52

Purpose: valuation of the effectiveness of the treatment with Nd:YAG laser in the ligamental lesions of the ankle.

DISCUSSION: The Nd:YAG laser has analgesic, anti-inflammatory, anti-edematous effects, which can be monitored by clinical observation.

METHOD: 15 athletes with ligamental lesions of the ankle have been enrolled. 10 patients have been treated with Nd:YAG laser and 5 with CO₂ laser. Assessment has been made by scale pain, tumefaction area and functional state of the joint before the treatment, after 1, 2, 3, 6, 12 weeks and 14 months from the treatment (follow up).

RESULTS: the patients treated with the Nd:YAG laser showed a very fast improvement in the pain symptoms and functional recovery with resume of the training, decrease of tumefaction area.

CONCLUSION: In sporting traumatology the effects induced by HILTherapy hasten the recovery time and this is particularly important in the case of agonists.

AUTHORS: Melegati G

INSTITUTIONS:

Galeazzi Institute for Orthopaedics, Milano, Italy

HILT treatment in calcific tendinopathy of the shoulder. A controlled perspective study

PROCEEDINGS:

1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006, pp.88-91

PURPOSE: To compare the results obtained with different treatments on 3 groups of patients affected by calcific tendinopathy of the shoulder.

DISCUSSION: A correlation has been shown between the disappearance of calcification and improvement of the clinical picture. The best performance in the control of pain symptoms in the post-treatment was obtained with the HILTherapy.

METHOD: 20 patients have been divided in 3 groups: the first (A) was treated with shock waves, the second (B) was treated with kinesis therapy and the third (C) was treated with Nd:YAG laser. Assessment was made before and after the treatments by the use of the constant scale, and x-ray 6 months after the treatment.

RESULTS: In the B group no significant improvement of the clinical picture was observed. In A and C groups a significant improvement of the clinical picture was obtained. In the C group the best results in the post-treatment were obtained, especially in the control of the pain.

CONCLUSION: both shock waves and HILTherapy improve the clinical picture in patients affected by calcific tendinopathy of the shoulder, but HILTherapy has a greater analgesic effect in comparison with shock waves.

AUTHORS: Ganzit GP, Gurin E

INSTITUTIONS:

Institute of Sport Medicine, Torino, Italy

HILT treatment in epicondylitis

PROCEEDINGS:

1st HILTHERAPY NATIONAL CONGRESS, Florence, September 2006, pp.53-62

PURPOSE: to assess the efficacy of HILTherapy on pain control and functional recovery in patients affected with epicondylitis.

DISCUSSION: The HILTherapy reduces pain and improves the functional state of the hand in epicondylitis

METHOD: 23 patients (mean age 42 years) have been enrolled. They were tennis players and were affected by epicondylitis, which did not respond to other therapies. The subjects were treated with HILTherapy (10 sessions). The pain and functional state were assessed before the treatment, after 5 and 10 sessions by Steinbroker scale, VAS and isometric strength.

RESULTS: pain significantly decreased after 5 sessions and was furtherly reduced after 10 sessions. Prehension strength strongly increased at the end of the therapy.

CONCLUSION: The treatment with HILTherapy reduces pain and improves the functional state on patients affected by persisting epicondylitis due to sport practice.

10
YEARS
Hiliterapia
SCIENCE
BEHIND

YOUR IMAGE IS OUR BUSINESS.



a VCA ANTECH company

800.268.5354

soundeklin.com



RLT-Vet™ Regenerative Laser Therapy
is a trademark of



ELECTRONIC ENGINEERING

SpA - Calenzano (FI) - Italy