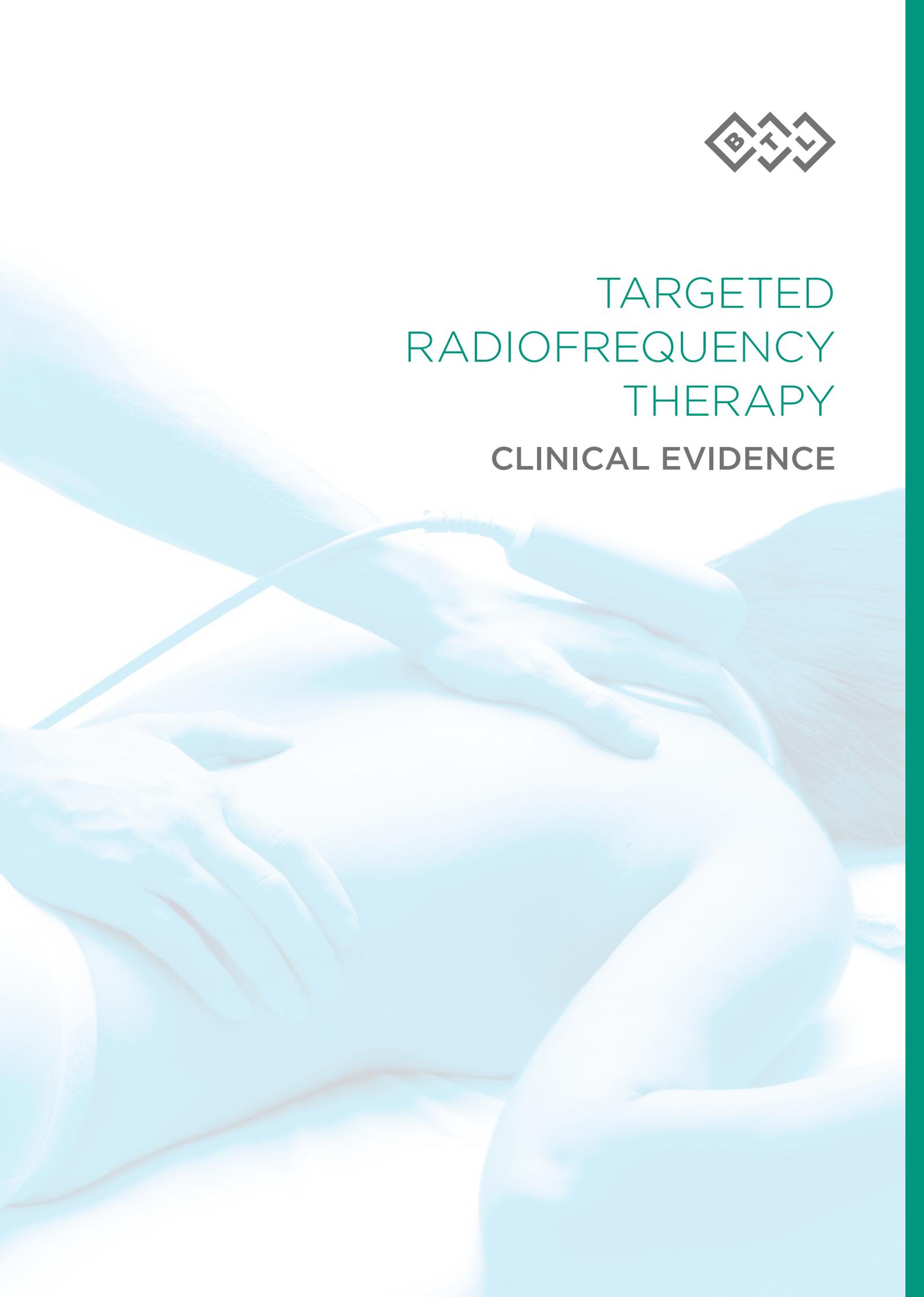




TARGETED  
RADIOFREQUENCY  
THERAPY  
CLINICAL EVIDENCE





## CONTENT

---

|  |           |
|--|-----------|
| <b>1. Introduction: Targeted Radiofrequency Therapy</b> .....  | <b>4</b>  |
| <b>2. Clinical studies: Abstracts</b> .....  | <b>5</b>  |
| Efficacy Evaluation of Targeted Radiofrequency Therapy in<br>Trigger Points and Functional Muscle Spasms Treatment .....                                 | 5         |
| Multicentre study on Tecar Therapy in sports pathologies .....   | 6         |
| Efficacy evaluation of TR-Therapy in the treatment of acute<br>and chronic disorders in sports .....   | 7         |
| Tecar Therapy in the treatment of acute and chronic<br>pathologies in sports .....   | 8         |
| Novel methods for the treatment of muscle trauma in athletes .....   | 10        |
| The effect of Human Tecar synergistic healthcare methodology<br>to reduce pain and edema after the grade II ankle´s sprain .....                         | 11        |
| Efficacy Evaluation Of Targeted Radiofrequency Therapy<br>In Trigger Points And Functional Muscle Spasms Treatment .....                                 | 12        |
| Effect of targeted radiofrequency therapy in combination<br>with post isometric relaxation in the treatment of pain syndrome<br>in cervical region ..... | 14        |
| Cervicalgia, Lumbago, Sciatica: Application of capacitive<br>energy transfer system .....  | 15        |
| Experimental study: Therapeutic application of Tecartherapy<br>in cervical pain syndromes .....  | 16        |
| Effectiveness of therapeutic hyperthermia by capacitive<br>- resistive electric transfer for degenerative neck pain .....                                | 18        |
| Hyperthermia to treat low back pain and gonarthrosis .....   | 20        |
| MF Capacitive contact diathermy and stretching of rectus<br>femoris versus stretching alone .....  | 21        |
| <b>3. Clinical cases</b> .....   | <b>22</b> |
| Ankle distortion, male patient .....   | 22        |
| Ankle distortion, female patient .....   | 23        |
| Post-surgery treatment of the anterior cruciate ligament .....   | 25        |
| Muscle inflammation .....  | 28        |
| Impingement syndrome .....   | 29        |



## INTRODUCTION: TARGETED RADIOFREQUENCY THERAPY

Targeted Radiofrequency Therapy transfers high frequency electromagnetic energy through the tissues of the body creating selective tissue hyperthermy. It has been scientifically proven to bring therapeutic effects such as immediate and intense pain relief, muscle relaxation, edema reduction and supporting tissue regeneration and healing.

Two different electrodes (capacitive and resistive) of the Targeted Radiofrequency Therapy provide precise and effective treatment at any tissue level. The capacitive electrode focuses the therapy into muscle layers. The resistive electrode targets tissue with higher impedance such as muscular insertions, tendons and bone surfaces.

## MEDICAL EFFECTS

### MUSCLE RELAXATION

The precise and aimed effect of the Targeted Radiofrequency Therapy on the hypertonic muscle fibers causes their immediate relaxation. The effect of myorelaxation is primarily based on vasodilation, which occurs immediately during the therapy and is responsible for higher supply of nutrients into the tissue.

### TISSUE REGENERATION AND HEALING

The improvement of tissue metabolism is a natural and valuable secondary outcome of the therapy. It leads to faster healing of the traumatized soft tissue and faster resorption of post-injury haematomas.

### EDEMA REDUCTION

The walls of the arterioles are enlarged and the precapillary sphincters relaxed, allowing increased local blood perfusion. This leads to an increase of the lymphatic processes (drainage) and subsequently to reduction of the edema.

### PAIN RELIEF

The principal effect of the Targeted Radiofrequency Therapy—the pain relief—results from muscle relaxation, edema reduction, tissue regeneration and healing.



## TITLE: EFFICACY EVALUATION OF TARGETED RADIOFREQUENCY THERAPY IN TRIGGER POINTS AND FUNCTIONAL MUSCLE SPASMS TREATMENT

Authors: Prof. Krasimira Kazalakova

Affiliations: Pirogov Hospital, Bul. Gen. Totleben 21, Sofia, Bulgaria

### ABSTRACT:

**Background and objectives:** Trigger points and muscle spasms are painful symptoms of fibromyalgia syndrome. They result in difficulties for performing Activities of Daily Living (ADL). An effective treatment of trigger points and muscle spasms decreases the pain and further results into mobility restoration. The aim of this controlled study was to evaluate the effect of the Targeted Radiofrequency Therapy (TR-Therapy) at 500 kHz for treating painful conditions caused by trigger points and functional muscle spasms compared to the methods of the conventional physiotherapy.

**Methods:** 40 subjects (n=22 female and n=18 male) diagnosed with trigger points and functional muscle spasms completed the study. They were assigned into two groups – Treatment and Control group. The Treatment group (subjects n=20) were delivered TR-therapy. The Control group (subjects n=20) were treated with conventional physiotherapy (electrotherapy, ultrasound therapy, magneto-therapy, microwave therapy). The primary outcome measure was pain perception evaluation. For the purpose a 10-point Visual Analogue Scale (VAS) for Pain was used (see Appendix 1.). The secondary outcome measure was a detailed assessment of the experienced difficulties to perform ADL. For the purpose a 24-part (each part is graded from 0 to 6) Patient Functional Assessment Questionnaire (PFAQ) was used (see Appendix 2.). The data were collected at pre- and post-treatment stage (right before the first and right after the last therapy).

**Results:** The average decrease of the pain perception in the Treatment group was 77 % and 63% in the Control group. The average improvement of the abilities to perform ADL in the Treatment group was 41 % and 21% in the Control group. A further statistical evaluation (Student's t-test) proved a significant difference between the post-treatment results of both groups. The evaluation of the results from VAS for Pain perception of both groups showed a statistical difference with  $p=3,42E-03$ . The evaluation of the results from PFAQ for ADL showed a statistical difference with  $p=7,07E-03$ .

**Conclusions:** Similar results proved the TR-Therapy as more effective solution in treatment of painful conditions with ADL limiting factor (led by trigger points and functional muscle spasms) compared to the conventional physiotherapy methods. The results could also be interpreted in a manner that TR-Therapy is a quality of life increasing solution.

**Key words:** Trigger Points, Muscle Spasms, Pain relief, Activities of Daily Living, Radiofrequency Therapy



## TITLE: MULTICENTRE STUDY ON TECAR THERAPY IN SPORTS PATHOLOGIES

*Authors: Tranquilli C., Ganzit G.P., Ciufetti A., Bergamo P., Combi F.*

*Affiliations: Italian Football Federation, FMSI Institute of Sports medicine - AC. Reggiana, Bassini Hospital, Cinisello Balsamo, Milan, Italy*

### ABSTRACT:

This study is a multicentre study conducted on 116 athletes with acute and chronic musculoskeletal and tendinous pathologies, who were administered procedures with Tecar therapy, which is a capacitive and/or resistive energy transfer therapy. The objective of the study was to measure the reduction of pain with VAS and to reduce motor recovery time.

### Results:

Pain survey using VAS on a total of 116 cases treated in the multicentre study

#### Visual analogue scale in acute cases:

|                    | Before     | After      |
|--------------------|------------|------------|
| Pain upon pressure | VAS: 8±0.5 | VAS: 4±1.1 |
| Pain at rest       | VAS:6±1.2  | VAS: 3±1.7 |
| Pain upon movement | VAS:8±1.9  | VAS: 3±1.7 |

#### Visual analogue scale in chronic cases:

|                    | Before     | After      |
|--------------------|------------|------------|
| Pain upon pressure | VAS: 7±1.3 | VAS: 3±1.5 |
| Pain at rest       | VAS:5±1.8  | VAS: 1±0.8 |
| Pain upon movement | VAS:7±1.2  | VAS: 2±0.5 |

### Case study of group supervised by C. Tranquilli, results:

The results showed strong significance in acute as well as chronic injuries with a fast and immediate reduction of the pain and shortened recovery times, determined by a prompt return to activity.



## TITLE: EFFICACY EVALUATION OF TR-THERAPY IN THE TREATMENT OF ACUTE AND CHRONIC DISORDERS IN SPORTS

### ABSTRACT:

The main objective of the present study is to demonstrate the efficacy of utilizing a novel non-invasive radiofrequency (RF) device in treatment of acute and chronic musculoskeletal disorders. The system is composed of a generator that distributes signals at a frequency of 500 kHz and maximum power of 324 W. The study surveyed 121 subjects (61 females, 60 males) between 18 and 58 years of age with acute and chronic disorders from different sports activities. The patients were divided into two groups, one consisted of 37 cases of acute disorders without previously treatments, and another consisted of 84 cases of chronic disorders treated by various traditional methods. The procedure began with capacitive mode with an electrode positioned on the area to be treated for 10 min., followed by another 10 minutes with a resistive electrode. The efficacy was monitored and evaluated by an independent observer using the Steinbroker classification for athletic activity and the visual analogue scale (VAS) from 0 to 10 where 0 corresponds to no pain and 10 to intolerable pain. The patients were treated for articular, muscular, and tendinous disorders. The clinical results indicate that TR- therapy is an effective method in the treatment of sports disorders of the musculoskeletal system.

### Results:

The present study enrolled a total of 121 athletes involved in various disciplines. The patients were treated for acute (88 subjects) and chronic (33 subjects) disorders which could be additionally subdivided in: articular (in 46.3% of cases), muscular (in 37.2% of cases), and tendinous (in 16.5% of cases) disorders. The final results showed significant improvement in articular as well as muscular and tendinous disorders with a fast reduction of the pain, measured with VAS. The statistical processing of data results in a P value of <0.0001. Only 8 patients still presented functional limitation, due to a chronic disorder, but reported an overall improvement in pain symptoms. No adverse events were observed during the study.

### Visual analogue scale evaluation:



## TITLE: TECAR THERAPY IN THE TREATMENT OF ACUTE AND CHRONIC PATHOLOGIES IN SPORTS

*Authors: Ganzit G.P., Stefanini L., Stesina G.*

*Affiliations: FMSI (Italian Sports Medicine Federation), CONI Institute of Sports Medicine, Torino*

### **ABSTRACT:**

This study utilized Tecar therapy, a capacitive and/or resistive energy transfer system that operates within the long wave radio frequency range in the treatment of acute and chronic musculo-articular pathology in athletes. Tecar therapy is characterized by the transfer of energy within tissues by using a capacitive electrode covered by an insulator and a resistive electrode conductor, following the mechanism of a condenser. The device used is composed of a generator that distributes signals at a frequency of 0.5 MHz at a maximum power of 300 watts. The study observed 327 subjects (120 females, 207 males) between 18 and 60 years of age with acute and chronic sports pathologies. They were divided into two groups, one comprised of 68 cases of acute pathologies which had not been previously treated, and another comprised of 259 cases of chronic pathologies treated by various methods. The sessions were started with resistive treatment with an electrode positioned on the area to be treated for 10 minutes (5 minutes for muscular pathology), followed by another 10 minutes (15 minutes for muscular pathology) with a capacitive electrode applied.

The progression of symptoms was clinically monitored and evaluated by an independent observer using the Steinbroker index modified for athletic activity and with the visual analogue scale (VAS) from 0 to 10 where 0 corresponds to no pain and 10 corresponds to intolerable pain. The pathologies treated were articular, muscular, and tendinous, and among these, those that displayed a more marked change in functional class were the muscular pathologies.

### **Results:**

The majority of the patients expressed a reduction in pain and improvement in function at the end of treatment and the categories of the modified Steinbroker index and VAS were statistically significant. The changes were statistically significant in acute and chronic cases and in the 3 pathology groups observed.

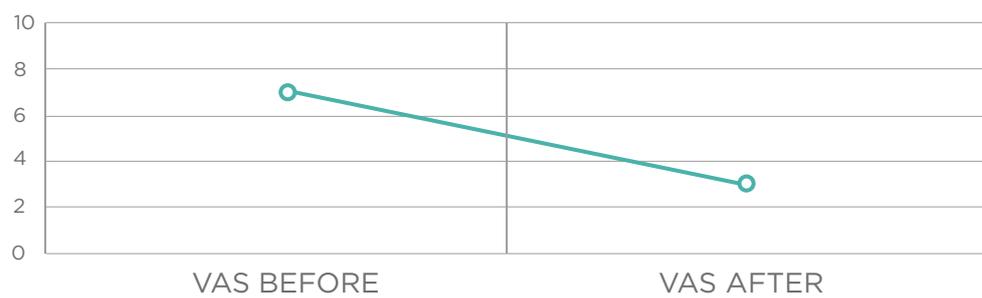
The results obtained are interesting and indicate that TecarR therapy is a useful tool in the treatment of pathologies of the locomotor system in sports. It overlaps with other therapies in terms of the presence or absence of certain positive effects, but it also has distinct characteristics that are effective even where other treatments have failed.



Steinbrocker index evaluation:

| Steinbrocker index | Before             |               | After              |               |
|--------------------|--------------------|---------------|--------------------|---------------|
|                    | Number of athletes | % of athletes | Number of athletes | % of athletes |
| 1                  | 6                  | 1.8           | 93                 | 28.4          |
| 2                  | 146                | 44.3          | 177                | 54.1          |
| 3                  | 145                | 44.3          | 54.0               | 16.5          |
| 4                  | 30                 | 9.2           | 3.0                | 0.9           |

Visual analogue scale evaluation:



## TITLE: NOVEL METHODS FOR THE TREATMENT OF MUSCLE TRAUMA IN ATHLETES

*Authors: Mondardini P., Tanzi R., Verardi L., Briglia S., Maione A., Drago E.*

*Affiliations: CONI Institute of Sports Medicine, FMSI (Italian Sports Medicine Federation) Bologna, Interuniversity Sports Medicine Study and Research Centre, Bologna office*

### ABSTRACT:

This paper presents the results of a two year study protocol intended to verify the efficacy of TECAR therapy in various grades of muscle lesions in athletes, by means of clinical-instrumental evaluations (pain, swelling, functional impotence, musculotendinous ultrasound) before and after one cycle of standardized treatment. 30 subjects (27 males and 3 females) with a mean age of 32 years (max. 58, min. 16), under observation for distractive-type muscle trauma, have been treated. Each patient has been assessed in terms of clinical symptomatology, and the diagnosis has been made by means of an ultrasound examination using a 7.5 MHz probe. The subjects have been treated at a rate of one session per day, with no more than 5 sessions per week, at least 72 hours after the trauma, and treatment has been continued until resolution of the situation as judged by ultrasound (reabsorption of the haematoma, the appearance of fibres in the lesion area, scar formation), for a maximum of 18 and a minimum of 5 applications in total (mean of 8). Despite the extent of some of the lesions treated, it has never been necessary to perform more than 18 treatments, giving an overall duration of 4 weeks of treatment.

### Materials and Methods:

The diagnosis has been established by ultrasound examination using a 7.5 MHz probe, and each patient has been evaluated in terms of clinical symptomatology, in particular:

- a) pain symptoms by means of evaluation using a visual analogue scale (VAS) from 1 to 10;
- b) active and passive muscle-joint function with manoeuvring against resistance.

Serial ultrasound examinations have been performed each week by the same operator and with the same device, in order to evaluate the organic alterations, induced during the treatment period, within the region of the muscle lesion.

### Results:

The excellent results obtained, in terms of speed of resolution of the clinical-symptomatological and ultrasound situation, combined with the ease of handling of the equipment, allow us to recommend TECAR therapy as a remarkably effective device in the early non-surgical treatment of muscle lesions.

In particular, the focused action guaranteed by the capacitive-resistive system implies good specificity of action in the areas affected by the lesion: the ease by which the width of the area treated can be controlled makes it possible to exclude any particularly delicate tissue areas (skin continuity, mucosa, etc.). The absence of any side effects detected by the study confirms the theoretical safety of capacitive-resistive energy transfer.

Biologically appreciable results can be obtained at depth without excessively high energy projection or concentration. Indeed, due to the effect of capacitive-resistive transfer, there is no contact current, only movement of charges (ions) due to attraction and repulsion. It has not been possible to conduct a statistical investigation on recovery times due to the lack of available literature on the topic.

However, based on our experience, we feel it may be stated that recovery times are very fast, and rehabilitative options are improved. This is possible thanks to the experimentally verified therapeutic efficacy of the treatment on the symptoms of pain and functional impotence, the rapid remission of which allows the early initiation of corrective rehabilitative techniques.



## TITLE: THE EFFECT OF HUMAN TECAR SYNERGISTIC HEALTHCARE METHODOLOGY TO REDUCE PAIN AND EDEMA AFTER THE GRADE II ANKLE'S SPRAIN

*Authors: Aftosmidis D., Zakalka I., Spanidou K., Kagioglou K.*

*Affiliations: Asklepeio Physiotherapy Clinic Thessaloniki Greece*

*Published: European Journal of Sports Medicine, Volume 1, Supplement 1, September 2013*

### **ABSTRACT:**

The main problem in rehabilitation of sprain and athlete's return to sports are the pain and the edema of the area. The conventional physical therapy uses various physical methods to reduce pain and edema for the early mobilization of the joint.

The aim of this study is to evaluate the effectiveness of Human Tecar Synergistic Healthcare Methodology in rehabilitation of a grade II ankle's sprain as a unique therapy to reduce pain and edema in short time.

### **Materials and Methods:**

Twenty patients with a 2nd grade ankle sprain were treated by Human Tecar Method. There were 12 men and 8 women with an average age of 23 years at injury. The sprain happened during the sports activity. All of them were treated with the Human Tecar Synergistic Healthcare Methodology therapy for 45 minutes once a day, the therapy was standardized. As primary outcome parameter we measure the mass of the edema in cc with eureka method and the pain were evaluated using a Visual Analogue Scale from 1 (no pain) to 10 (maximum pain).

### **Results:**

On the sixth day of injury after five therapies the pain was reduced from 7 to 2 at VAS and the mass of the foot was returned to normal with an average reduction of the edema at 3cc.



# TITLE: EFFICACY EVALUATION OF TARGETED RADIOFREQUENCY THERAPY IN TRIGGER POINTS AND FUNCTIONAL MUSCLE SPASMS TREATMENT

Authors: Prof. Krasimira Kazalakova

Affiliations: Pirogov Hospital, Bul. Gen. Totleben 21, Sofia, Bulgaria

## ABSTRACT:

### Background and objectives:

Trigger points and muscle spasms are painful symptoms of fibromyalgia syndrome. They result in difficulties for performing Activities of Daily Living (ADL). An effective treatment of trigger points and muscle spasms decreases the pain and further results into mobility restoration. The aim of this controlled study was to evaluate the effect of the Targeted Radiofrequency Therapy (TR-Therapy) at 500 kHz for treating painful conditions caused by trigger points and functional muscle spasms compared to the methods of the conventional physiotherapy.

### Methods:

40 subjects (n=22 female and n=18 male) diagnosed with trigger points and functional muscle spasms completed the study. They were assigned into two groups - Treatment and Control group. The Treatment group (subjects n=20) were delivered TR-therapy. The Control group (subjects n=20) were treated with conventional physiotherapy (electrotherapy, ultrasound therapy, magneto-therapy, microwave therapy). The primary outcome measure was pain perception evaluation. For the purpose a 10-point Visual Analogue Scale (VAS) for Pain was used. The secondary outcome measure was a detailed assessment of the experienced difficulties to perform ADL. For the purpose a 24-part (each part is graded from 0 to 6) Patient Functional Assessment Questionnaire (PFAQ) was used. The data were collected at pre- and post-treatment stage (right before the first and right after the last therapy).

### Results:

The average decrease of the pain perception in the Treatment group was 77 % and 63% in the Control group. The average improvement of the abilities to perform ADL in the Treatment group was 41 % and 21% in the Control group.

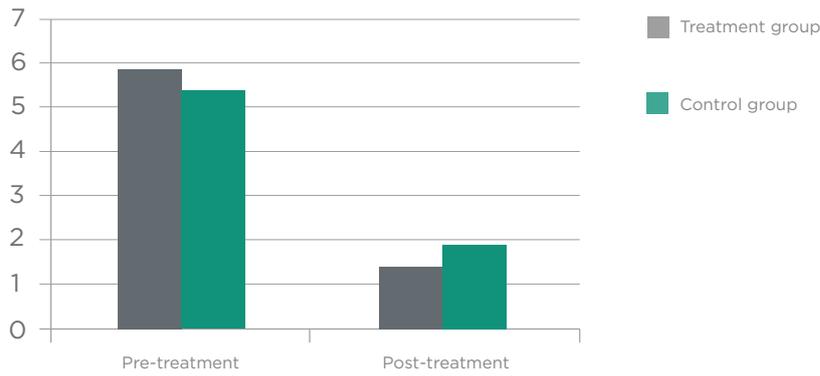
### Conclusions:

Similar results proved the TR-Therapy as more effective solution in treatment of painful conditions with ADL limiting factor (led by trigger points and functional muscle spasms) compared to the conventional physiotherapy methods. The results could also be interpreted in a manner that TR-Therapy is a quality of life increasing solution.

### Visual analogue scale evaluation (table):

|                | GROUP           |               |
|----------------|-----------------|---------------|
|                | Treatment Group | Control Group |
| Pre-treatment  | 5.90 ± 1.33     | 5.45 ± 1.15   |
| Post-treatment | 1.40 ± 0.60     | 1.95 ± 0.51   |
| Decrease       | 4.50 ± 1.00     | 3.50 ± 1.10   |
| Decrease, %    | 77%             | 63%           |

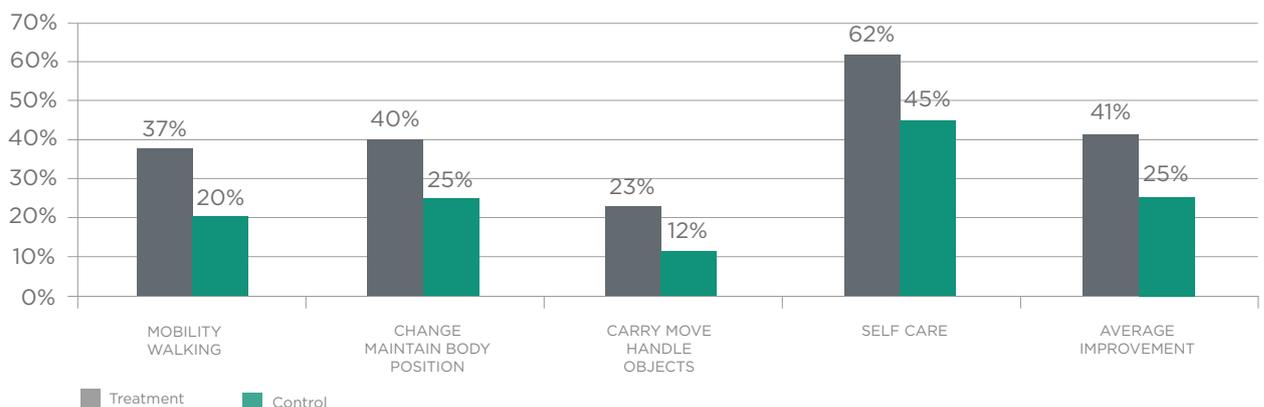
### Visual analogue scale evaluation, absolute points (graph):



### PFAQ evaluation (table):

| ADL                           | Treatment group |             |              |                 | Control group |             |              |                 |
|-------------------------------|-----------------|-------------|--------------|-----------------|---------------|-------------|--------------|-----------------|
|                               | Pre-treat.*     | Post-treat. | Improve-ment | Improve-ment, % | Pre-treat.    | Post-treat. | Improve-ment | Improve-ment, % |
| MOBILITY WALKING              | 1.28±1.64       | 0.33±0.47   | 0.94±1.21    | 37%             | 1.00±1.24     | 0.46±0.50   | 0.54±0.84    | 20%             |
| CHANGE MAINTAIN BODY POSITION | 0.79±0.93       | 0.19±0.42   | 0.60±0.76    | 40%             | 0.78±0.95     | 0.34±0.48   | 0.44±0.75    | 25%             |
| CARRY MOVE HANDLE OBJECTS     | 0.72±1.24       | 0.14±0.35   | 0.58±1.07    | 23%             | 0.53±0.95     | 0.33±0.65   | 0.23±0.48    | 12%             |
| SELF CARE                     | 1.29±1.07       | 0.30±0.50   | 0.99±0.79    | 62%             | 1.52±1.06     | 0.59±0.60   | 0.93±0.99    | 45%             |
| Average Improvement           | 1.02±1.27       | 0.24±0.44   | 0.78±1.01    | 41%             | 0.97±1.12     | 0.43±0.57   | 0.54±0.82    | 25%             |

### PFAQ evaluation (graph):



# TITLE: EFFECT OF TARGETED RADIOFREQUENCY THERAPY IN COMBINATION WITH POST ISOMETRIC RELAXATION IN THE TREATMENT OF PAIN SYNDROME IN CERVICAL REGION

*Authors: Maria Gonkova, MD, PhD, Semat Hasan, MD*

*Affiliations: Physical and Rehabilitation Department, Medical University Plovdiv, Plovdiv, Bulgaria*

## **ABSTRACT:**

### **Background and objectives:**

Pain accompanied by restricted mobility within the cervico-cranial and cervico-brachial regions is an often met condition among patients from working age population as well as patients above the age of 60-65 years. Targeted Radiofrequency Therapy (TR-Therapy) is a noninvasive treatment, improving these conditions and further resulting in increased quality of life.

### **Aim:**

The aim of this study is to evaluate the effect of TR-Therapy combined with Post Isometric Relaxation (PIR) in the treatment of painful conditions with mobility limiting factor in the cervical spine.

### **Methods:**

30 patients experiencing pain and accompanying mobility limiting factor in the cervico-cranial and cervico-brachial regions were enrolled in this study. The Treatment group received combined sessions (TR-Therapy combined with PIR). The control group received equal number of PIR (only) treatments. The primary outcome measures were: Pain perceptions evaluation in rest, moving and upon palpation conditions (10-point VAS scale); Mobility evaluation by composite methods including Range of motion ( $^{\circ}$ ) and distance (cm) measurements for shortened muscles evaluation. Data were collected at pre- and post-treatment stage.

### **Results:**

The results of the study show statistical difference between the levels of improvements in both treatment and control group.

### **Conclusions:**

TR-Therapy in combination with PIR techniques is an effective method for pain treatment and mobility restoration, ameliorating patient's quality of life.



## TITLE: CERVICALGIA, LUMBAGO, SCIANTICA: APPLICATION OF CAPACITIVE ENERGY TRANSFER SYSTEM

Authors: Molina A., Eschacho B., Molina M. V., Mariscal S.

Affiliations: Rehabilitation Unit, University Hospital of Valladolid Barcelona

### ABSTRACT:

For this study, we selected a total of 23 patients (lumbosciatica, lumbago - 11 patients, cervicobrachialgia, cervicalgia - 12 patients) sent from the Rehabilitation Unit of the University of Valladolid Hospital with diagnoses of simple lumbago, lumbosciatica, cervicalgia, and cervicobrachialgia after treatment with non-steroidal anti-inflammatory drugs and conventional electrotherapy was unsuccessful. At the Centre, all were treated with the Capacitive Energy Transfer system. In this study, we describe the protocol of the treatment, diagnostic parameters, clinical course of development, and results obtained.

### Materials and methods:

Following the physical exam, analyses were conducted on cervical and/or dorso-lumbar mobility, the presence or absence of pain in the area, the presence of muscular contractions, reactions to load manoeuvres, signs of root injury, problems with osteotendinous reflexes, changes in sensitivity, muscular strength, and, in cases of lumbago and sciatica, changes in gait.

### Treatment:

The number of treatment sessions per patient ranged from a maximum of 7 to a minimum of 4, with a mean of 6. The application time of the treatment for each session ranged from 5-10 minutes with 8 minutes for the cervical column and 9 minutes for the lumbar column.

### Extract or results:

#### Cervicalgia and cervicobrachialgia:

|                            | Before               | After               |
|----------------------------|----------------------|---------------------|
| Degree of pain             | VAS: 3-10 (mean 6.8) | VAS: 1-8 (mean 4.6) |
| Paresthesia in upper limbs | 12 patients          | 5 patients          |
| Limited cervical mobility  | 5 patients           | 2 patients          |

#### Lumbago and sciatica:

|                              | Before               | After               |
|------------------------------|----------------------|---------------------|
| Degree of pain               | VAS: 5-10 (mean 6.8) | VAS: 1-8 (mean 5.6) |
| Limited dorsolumbar mobility | 5 patients           | 3 patients          |

### Conclusions:

Based on the clinical evaluation of the data obtained, it can be concluded that a substantial improvement was achieved in 65% of the patients treated with Capacitive Energy Transfer.



## TITLE: EXPERIMENTAL STUDY: THERAPEUTIC APPLICATION OF TECARTHERAPY IN CERVICAL PAIN SYNDROMES

*Authors: Raffaeta G., Menconi A., Togo R.*

*Affiliations: U.O. I Clinica Ortopedica, Sezione di Riabilitazione Funzionale Ortopedica, Università degli Studi di Pisa, Pisa*

### ABSTRACT:

Our study aims to evaluate the therapeutic efficacy of Tecartherapy “by patients”, suffering from chronic cervical pain syndromes unique, recruited on an ongoing basis, at our clinic physiatric.

### Materials and Methods:

In our study and was examined a sample of 40 patients. The result shows the data on the first 20 patients, the other 20 are still under investigation and pending assessment at follow-up in two months.

During treatment with Tecartherapy “not affect ment results of the study have not been used other treatments, it physical, pharmacological them. Patients were evaluated before treatment, at the end of the treatment protocol and two months later with: scorecard “Neck pain questionnaire” (NPQ), numerical rating scale “Numerical Rating Scale” (NRS) for the assessment of pain, from 0 to 10, where 0 means no pain, both at rest and in motion, and 10 in unbearable pain.

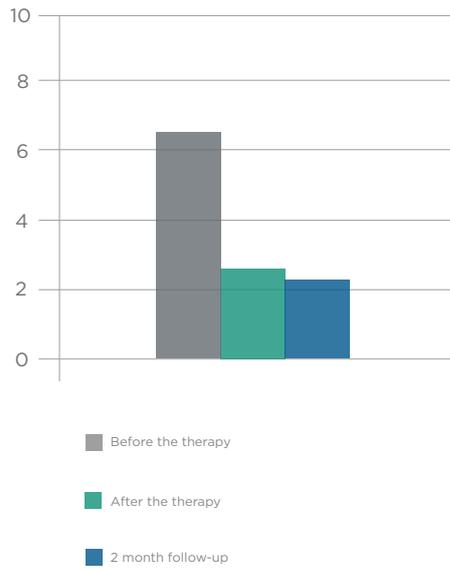
The therapeutic session lasting 20 minutes start with 10 minutes of treatment capacitive, performed with the power adjusted in such a way as to obtain maximum skin temperature accepted by the patient, on average 60-70%: the capacitive electrode is made to slide from ‘operator on the cervical region, in particular, acts on the trapezius muscles, sternocleidomastoid, pectoral; subsequently followed by 5 minutes of resistive treatment during which the patient has to make active movements of flexion-extension, rotation left and right, tilt left and right side, the meeting closed with a 5-minute treatment capacitive.

### Results:

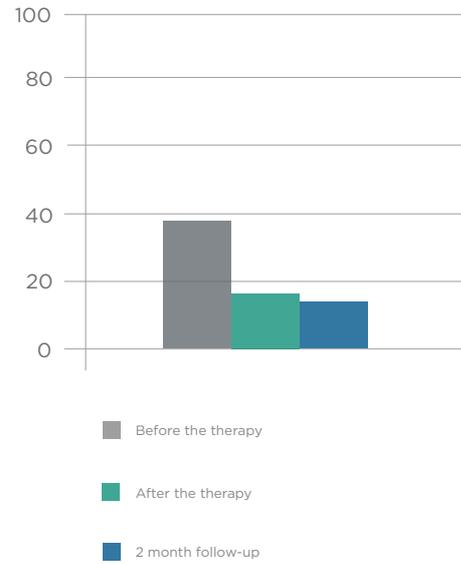
Observing the distribution of the results of the evaluation scale of pain NRS we note that on average the value NRS drops from 6.63 to 2.70, up to 2.55 at follow-up to two months. More in detail , the calculation of the median, we note that if the first treatment 50% of patients complain of a NRS up to 6, immediately after treatment 50% of the patients indicates a value around 2, in addition to the follow-up to two months 50% of patients scen- of a NRS score <2. Regarding the analysis of the results to the Neck Pain Questionnaire there was a significant decrease in the score NPQ score from 37.95% to 16.67% at the end of treatment and the score decreases again to follow-up to two months, 12.54%.



NRS evaluation:



NPQ evaluation:



## TITLE: EFFECTIVENESS OF THERAPEUTIC HYPERTHERMIA BY CAPACITIVE-RESISTIVE ELECTRIC TRANSFER FOR DEGENERATIVE NECK PAIN

*Authors: Dr. Emilia Vicent Pastor, Dr. Francesc Inglés Pernía*

*Affiliations: Department of Physical Medicine and Rehabilitation, University Hospital Clinic, Valencia, Spain*

### ABSTRACT:

The main objective was to evaluate the effectiveness of INDIBA, S.A.'s, non-invasive hypothermia system by radio frequency based on Capacitive-Resistive Electric Transfer for the treatment of degenerative neck pain in comparison with the common treatment for this disease using phonophoresis.

A secondary objective was to evaluate the patients' tolerance and acceptance to the treatment.

### Materials and Methods:

A prospective, single-centre, phase IV, open, controlled, randomized, parallel-group study. The research plan was designed in accordance with the AGEMED norm, which regulates the clinical research of health products, and approved by the Hospital Ethics Committee.

A total of 100 participants were recruited (50 for each treatment group) from visits at the Department of Physical Medicine and Rehabilitation at the University of Valencia Hospital Clinic. The patients assigned to treatment group A (with the hyperthermia equipment MD-308) received the treatment according to the following scheme. Application of the capacitive electrode for five minutes followed by the application of the resistive electrode for ten minutes per session. The treatment consisted of one session a day for five consecutive days, followed by a two-day pause and then another daily session for five consecutive days. Total of 10 sessions. When necessary (because the condition was not cured or it was only partially cured), an additional session was administered every other day for six days. The maximum period allowed for treatment of the disease being studied was one month.

Patients in group B were treated with the treatment usually given in the Department of Physical Medicine and Rehabilitation, which consists of six-minute sessions of phonophoresis using an ultrasound dose 0.2 W/cm<sup>2</sup>. The treatment comprised one session a day for five consecutive days, followed by a two-day pause and then another daily session for five consecutive days. Total of 10 sessions.

### Efficacy parameters:

Pain evaluation: By means of the Visual Analogue Scale (VAS) from 0cm to 10cm, where "0" means no pain and "10" means very severe pain. The VAS was completed by the patients before and after the treatment sessions. Pain was measured using the following variables:

Daytime pain, long term pain, provoked pain, spontaneous pain.

### Additional evaluations:

Dizziness, occasional paresthesia, movement limitations in flexion/extension, rotations and lateral flexions according to the Meigne technique, other pre- and post-treatment signs and symptoms, record of any concomitant medication.



**Results:**

The percentage of patients without pain increases as the sessions continue in both the patients treated with CRET and those treated with ultrasound, with a clearer improvement between the first and last visits in those patients treated with CRET. The percentage of patients that improve with respect to daytime pain and long term pain is greater for those treated with CRET.

Both treatments improve provoked pain throughout all of the sessions; however, CRET acts faster, improving pain in more visits and from the beginning in a statistically significant manner ( $p < 0.005$ ) whereas with ultrasound, statistical significance is not reached until visits 6 and 10 (end). There once again appears to be a trend favoring CRET, yet without reaching statistical significance.

With respect to spontaneous pain, CRET acts faster, with improvement beginning from the first session, and the improvement is more sustainable than with ultrasound (statistically significant intra-group difference).

INDIBA's method of hyperthermia by Capacitive-Resistive Electric Transfer (CRET) has proved to be an effective and safe method for treating degenerative neck pain in comparison with ultrasound (the common treatment for this problem), showing faster analgesic efficacy.



## TITLE: HYPERTHERMIA TO TREAT LOW BACK PAIN AND GONARTHROSIS

*Authors: Saggini R., De Antoni A., Cancelli F., Cacchio A., Di Mascio R., Di Nicola M., Ballone E.*

### **ABSTRACT:**

The purpose of this study is to set forth the results achieved with the hyperthermia treatment of low back pain due to slipped disk, as diagnosed through MRI, and moderate gonarthrosis as diagnosed through X-ray examination.

### **Materials and Methods:**

80 patients, divided into two groups have been subjected to evaluation. The first group included 35 patients suffering from low back pain, the second group included 45 patients suffering from gonarthrosis.

The treatment consisted in a cycle including ten sessions (at the rate of three sessions per week) lasting 30 minutes each.

Patients were evaluated by use of VAS and of a questionnaire reporting any intake of FANS.

### **Results:**

The statistical analyses of the results indicate a significant reduction of pain and of the intake of FANS after the treatment in the case of both ailments, and an optional stabilization of VAS results in the group of patients suffering from gonarthrosis and the checks performed 6 and 12 months after treatment. In the case of low back pain, the instances in which pain returns after 6 and 12 months of follow-up are statistically significant ( $p < 0.05$  Wilcoxon test).

## TITLE: MF CAPACITIVE CONTACT DIATHERMY AND STRETCHING OF RECTUS FEMORIS VERSUS STRETCHING ALONE - EXPERIMENTAL FINDINGS

Authors: Pancari G., Di Domenica F., Ferrari G., Nappo D., Tornese D., Gallamini M.

### ABSTRACT:

#### Background:

Stretching is a method of treatment and it is part of the training of many professionals and amateurs sportsmen. Among MF contact diathermy claims there is the capability to perform deep tissues heating and to promote muscular tissues plasticity.

#### Purpose of the study:

Aim of this test has been the evaluation of the association between physical therapy and active exercise to induce stiffness reduction and to increase muscle length.

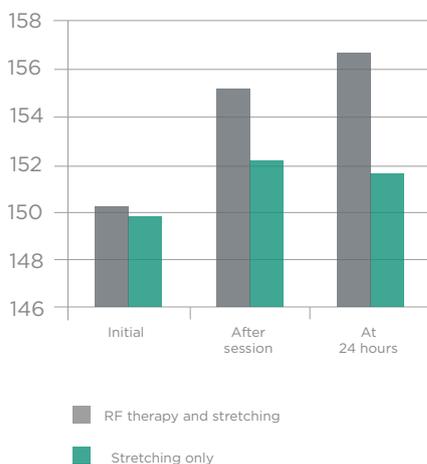
#### The test:

63 subjects were subjected to a single treatment of active stretching for the rectus femoris in prone position. A capacitive diathermy treatment was applied for 20 minutes on one randomly chosen leg while intermittent active dynamic stretching was performed bilaterally for the last 10 minutes. A total of 126 limbs were evaluated by the same therapist using standard knee flexion control methods to assess both muscular stiffness and muscle length of the rectus femoris before the treatment session, immediately after and 24 hours later.

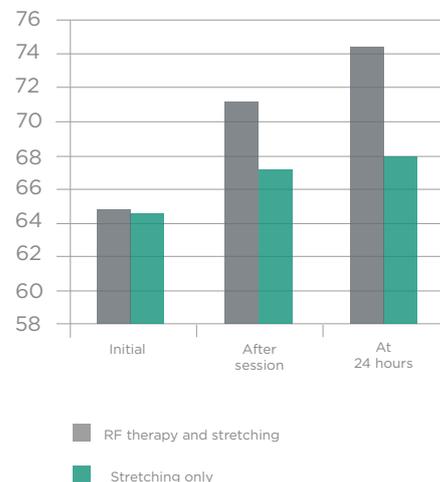
#### Results:

The results of our investigation (63 combined stretching-and-diathermy and 63 stretching alone) show a remarkably greater increase of the measured angles - both in the stiffness and in the muscle length evaluation - in the limb treated with combined diathermy and stretching than in the contralateral one that did receive stretching only. Such differences were found to be highly significant. The beneficial effect was observed to expand at 24 hours. Attempts of further sub-grouping according to sex, size, body structure, intensity of physical activity although confirming beneficial effects did not reach T-test significant values.

#### Rectus femoris stiffness test:



#### Rectus femoris length test:



# TR-THERAPY

## CLINICAL CASE

### ANKLE DISTORTION



The patient was 41-year-old **male**, who suffered ankle distortion of the left limb. When he visited the therapist, TR-Therapy along with other manual and active techniques was applied in order to support the healing processes, reduce the edema of the ankle and to decrease the pain. Within 14 days, the patient underwent five TR-Therapy sessions.

#### 1<sup>ST</sup> THERAPY SESSION

Massive hematoma and edema were present. The ankle joint had limited range of motion. The ankle was in pain both when relaxed and upon palpation. Athermic therapy in capacitive mode along with manual lymphatic massage was applied in order to reduce the edema. Additionally, lymphatic taping was used.



*Before the 1<sup>st</sup> therapy*

#### 2<sup>ND</sup> THERAPY SESSION

Reduction of both the pain and the edema were observed. The ankle joint was still limited in its range of motion. Again athermic therapy in capacitive mode along with manual lymphatic massage was applied to support the edema reduction. Additionally, the therapist performed passive motions of the ankle joint.



*2<sup>nd</sup> therapy*

#### 3<sup>RD</sup> THERAPY SESSION

Further reduction of pain, edema and hematoma was observed. Capacitive mode was used in athermic range along with passive stretching and active exercises of the muscles. Resistive therapy at level II (considering Schliephake scale) was applied along with additional active exercise. Further within this session, TR-Therapy was followed by stability exercises.



*3<sup>rd</sup> therapy*

#### 4<sup>TH</sup> THERAPY SESSION

Range of motion of the ankle joint was restored in full extend. TR-Therapy in capacitive mode was applied to m. Triceps surae in order to cause muscle relaxation. Resistive therapy mode was applied around the ankle joint and active exercises were incorporated along with that. Additionally, capacitive mode in athermy was applied to support lymph drainage in the lower limb.



*4<sup>th</sup> therapy*

#### 5<sup>TH</sup> THERAPY SESSION

We can state, that the patient was almost without difficulties when he came to the fifth therapy session. Thus more active training and stabilization exercises were done and the case was closed.



*After the 5<sup>th</sup> therapy*

A **female** patient age 35 came in 3 days after suffering instep and ankle distortion on left foot. TR-Therapy was incorporated in order to reduce pain, edema and to increase range of motion of the ankle. Three therapies were applied in one week.

## 1<sup>ST</sup> THERAPY SESSION

### State prior to the session

The patient complained of big pain in the area of left ankle upon rest and motion. Edema of the instep and ankle is present (Table 1) as well as a hematoma.

### Goal of the first therapy

The goal was to decrease pain in the left ankle.

### Therapy procedure

TR-Therapy was used to treat the left ankle. Therapy was applied only in capacitive mode. Neutral electrode was placed under patient's left thigh. Lymphatic taping was applied after the therapy.



*Before the 1<sup>st</sup> therapy*

### TR-Therapy parameters

|   |            |
|---|------------|
| Therapy mode  | capacitive |
| Therapy time  | 20 minutes |
| Continuous / pulsed   | continuous |
| Intensity on Schliephake scale<br>(Intensity set on the device) | I (3-5%)   |
| Manual techniques used during TR-Therapy                        | -          |

### State after the therapy

The patient described relief of pain and lowered tension in the ankle. The circumference of the ankle was measured (Table 1). Reduction of edema was achieved.

## 2<sup>ND</sup> THERAPY SESSION

### State prior to the session

The patient described ongoing pain in the left ankle upon movement, but not rested. Edema (Table 1) and hematoma were still present.

### Goal of the second therapy

The goal is to decrease pain and increase range of motion in the left ankle.

### Therapy procedure

The TR-Therapy was used to treat the left ankle. Therapy is applied in capacitive, then resistive and then again in capacitive mode. Throughout the therapy, manual lymphatic drainage is applied. Neutral electrode is placed under the thigh of the treated lower limb. Lymphatic taping is performed after the therapy together with light post-isometric relaxation of the muscles of the calf.

### TR-Therapy parameters

|   |                          |            |            |
|---|--------------------------|------------|------------|
| Therapy mode  | capacitive               | resistive  | capacitive |
| Therapy time  | 10 minutes               | 10 minutes | 10 minutes |
| Continuous / pulsed   | continuous               | continuous | continuous |
| Intensity on Schliephake scale<br>(Intensity set on the device) | II (20%)                 | I (3-5%)   | I (5%)     |
| Manual techniques used during TR-Therapy                        | Manual lymphatic massage | -          | -          |

### State of the patient after the therapy

The patient described relief in term of further decrease of pain in the left ankle and increase of range of motion in the treated area. Edema reduction was also observed (Table 1).



### 3<sup>RD</sup> THERAPY SESSION

#### State prior to the session

Pain in the left ankle remains only in extreme positions upon movement. Edema is minimal as well as the hematoma.

#### Goal of the 3rd therapy

The goal is to decrease the pain and increase the range of motion in the left ankle. Active exercises will be performed with the goal of stabilization of the ankle joint, further practice of step towards and gait.



Before the 3<sup>rd</sup> therapy

#### Therapy procedure

The TR-Therapy was used to treat the left ankle. It was applied in the capacitive, resistive and then again in capacitive mode. Manual lymphatic massage was performed throughout the therapy together with passive and active movement of the joint. The neutral electrode was placed under the patient's left thigh. After the therapy post-isometric relaxation of calf muscles, active exercises of the range of motion, gait, stabilizing exercises of the ankle, step towards and exercise on balance platform.

#### TR-Therapy parameters

|  |   |  |            |
|--|---|--|------------|
| Therapy mode   | capacitive  | resistive                                | capacitive |
| Therapy time   | 15 minutes  | 15 minutes                               | 5 minutes  |
| Continuous / pulsed  | continuous  | continuous                               | continuous |
| Intensity on Schliephake scale (Intensity set on the device) | II (25%)  | II (15-20%)                              | I (5%)     |
| Manual techniques used during TR-Therapy                     | Manual lymphatic massage, passive movement of the ankle | Passive and active movement in the ankle | -          |

#### State after the therapy

The patient described complete relief of pain even in extreme positions of the ankle. Throughout the therapy edema reduction was achieved (Table 1). For successful results the therapy was terminated and the patient was informed how to continue in active exercise.

Table 1: Examination of the edema through measurement of the circumference of the instep and ankle

|                                  | 1 <sup>st</sup> therapy session |         | 2 <sup>nd</sup> therapy session |       | 3 <sup>rd</sup> therapy session |       |
|----------------------------------|---------------------------------|---------|---------------------------------|-------|---------------------------------|-------|
|                                  | Before                          | After   | Before                          | After | Before                          | After |
| Circumference of the left instep | 26,5 cm                         | 25 cm   | 24 cm                           | 23 cm | 23 cm                           | 22 cm |
| Circumference of the left ankle  | 28 cm                           | 26,5 cm | 25,5 cm                         | 25 cm | 25 cm                           | 24 cm |



Clinical case by: **Monika Házová, M.Sc.**  
Physiotherapist

# TR-THERAPY

## CLINICAL CASE

### POST-SURGERY

### TREATMENT OF THE

### ANTERIOR CRUCIATE

### LIGAMENT (ACL)



Patient age 39 came 14 days after arthroplasty of the ACL in the left knee. TR-Therapy was incorporated into the therapy in order to support healing of the tissue in the area, through which decrease of pain, edema reduction and increase of range of motion was achieved. Three therapies were performed altogether in 10 days.

#### 1<sup>ST</sup> THERAPY SESSION

##### State prior to the session

Patient came using crutches while stepping on the affected leg. The stitches were extracted. Pain is present only upon movement. There's no pain upon rest. Left knee is swollen (Table 1) and the range of motion is limited in the direction of flexion and extension (Table 2).

##### Goal of the therapy

The goal of the therapy is decreasing pain and edema of the left knee and wound treatment.



*Before the 1<sup>st</sup> therapy*

##### Therapy procedure

TR-Therapy was used to treat left lower limb. For the first therapy only the capacitive mode was used. Patient was lied down on their back. The neutral electrode was placed under the left thigh. Throughout the TR-Therapy, manual lymphatic massage was performed in order to reduce the edema in the area. After finishing the TR-Therapy, patella mobilization of the left knee follows, pressure massage of the post-surgery scar, passive motion of the left knee and active exercises with overball.

##### TR-Therapy parameters

|   |                          |
|---|--------------------------|
| Therapy mode  | capacitive               |
| Therapy time  | 20 minutes               |
| Continuous / pulsed   | continuous               |
| Intensity on Schliephake scale<br>(Intensity set on the device) | I (3-5%)                 |
| Manual techniques used during TR-Therapy                        | Manual lymphatic massage |

##### State after the therapy

Patient described relief in terms of less tension in the left knee and through measurement it was confirmed that the edema was reduced in the area (Table 1).

## 2<sup>ND</sup> THERAPY SESSION

### State prior to the session

Patient described lowering the pain in the knee joint while walking. Edema of the joint had decreased in comparison with the first session (Table 1). The range of motion also increased since the first therapy (Table 2).

### Goal of the therapy

Goal of the therapy was to decrease pain and increase range of motion of the left knee. Another goal is to achieve better stability of the knee.

### Therapy procedure

TR-Therapy was used to treat the left lower knee. For second therapy the combination of capacitive and resistive mode was used. Patient was laid on the back with neutral electrode placed under the left thigh. During TR-Therapy manual lymphatic massage was applied and isometric muscle contractions of the left limb. After finishing TR-Therapy, mobilization of the patella, post-isometric relaxation of the muscles around the knee, active exercises with overball, active exercises on segment and active exercises for knee stabilization were performed.

### TR-Therapy parameters

|  |  |            |
|--|--|------------|
| Therapy mode   | capacitive   | resistive  |
| Therapy time   | 15 minutes   | 10 minutes |
| Continuous / pulsed  | continuous   | continuous |
| Intensity on Schliephake scale (Intensity set on the device) | I-II (3-15%)   | I (3-5%)   |
| Manual techniques used during TR-Therapy                     | Manual lymphatic massage, isometric muscle contraction | -          |

### State after the therapy

Patient described relief in terms of lowered tension in the knee joint and by measurement was confirmed that the edema was reduced (Table 1) and also the range of motion was increased (Table 2).

## 3<sup>RD</sup> THERAPY SESSION

### State prior to the session

The patient described decrease of pain and tension in the left knee upon movement. The patient could walk without the need of crutches. Edema of the left knee (Table 1) and the range of motion (Table 2) was same as at the second therapy session.

### Goal of the therapy

Goal of the therapy is decrease of pain and increase of the range of motion in the left knee. The goal is also to stabilize the left knee and practice of gait stereotype.

### Therapy procedure

TR-Therapy was incorporated to treat the left lower limb. For the third therapy the combination of capacitive and resistive mode is used again. Patient was laid on their back with the neutral electrode placed below the left thigh. Throughout the TR-Therapy, manual lymphatic massage, isometric contraction of the left lower limb muscle groups and active and passive movement of this limb, active movement against force and post-isometric relaxation (PIR) of the muscles surrounding the knee were applied. After finishing the TR-Therapy the session was continued with gait stereotypes practice, stabilization of the knee through active exercises standing up and on balance platform.

### TR-Therapy parameters

|  |   |  |
|--|---|--|
| Therapy mode   | capacitive  | resistive  |
| Therapy time   | 15 minutes  | 10 minutes   |
| Continuous / pulsed  | continuous  | pulsed   |
| Intensity on Schliephake scale (Intensity set on the device) | II (15-20%)   | I-II (15%)   |
| Manual techniques used during TR-Therapy                     | Manual lymphatic massage, isometric contractions of the left lower limb muscle groups, active and passive movement of the left limb | Active movement against force and PIR of the muscles surrounding the left knee |

### State after the therapy

The patient described relief in terms of lower tension in the left knee and through measurement edema reduction was confirmed (Table 1) as well as increase in range of motion (Table 2). For successful results the therapy was terminated and the patient was advised on how to exercises at home.

Table 1: Examination of the edema through measurements of the circumference of the left knee

|                                | 1 <sup>st</sup> therapy session |         | 2 <sup>nd</sup> therapy session |       | 3 <sup>rd</sup> therapy session |       |
|--------------------------------|---------------------------------|---------|---------------------------------|-------|---------------------------------|-------|
|                                | Before                          | After   | Before                          | After | Before                          | After |
| Circumference of the left knee | 44 cm                           | 42,5 cm | 42 cm                           | 41 cm | 41 cm                           | 40 cm |

Table 2: Examination of the range of motion of the left knee

|           | 1 <sup>st</sup> therapy session |       | 2 <sup>nd</sup> therapy session |       | 3 <sup>rd</sup> therapy session |       |
|-----------|---------------------------------|-------|---------------------------------|-------|---------------------------------|-------|
|           | Before                          | After | Before                          | After | Before                          | After |
| Flexion   | 60°                             | -     | 70°                             | 80°   | 80°                             | 90°   |
| Extension | -10°                            | -     | -10°                            | -5°   | -5°                             | 0°    |



Clinical case by: **Monika Házová, M.Sc.**  
Physiotherapist



# TR-THERAPY

## CLINICAL CASE

### MUSCLE INFLAMMATION



The patient was 36-year-old male with inflammation of m. Peroneus longus. Originally, the muscle inflammation was treated using antibiotics, but the pharmacotherapy failed. He decided to visit a physiotherapist, who incorporated TR-Therapy into the sessions to support reduction of the edema and erythema and to decrease the pain in the area. Altogether, four therapy sessions were done in one week period.

#### 1<sup>ST</sup> THERAPY SESSION

Before the first therapy, a massive edema and erythema of the peroneal area were present. The patient described pain at rest and at palpation. TR-Therapy in capacitive mode and athermic range was applied along with passive motions of the ankle joint and additional lymphatic taping.

#### 2<sup>ND</sup> THERAPY SESSION

It came to significant improvement of all evaluated symptoms - edema, erythema and pain. Capacitive therapy mode was applied first in slight thermic and then in athermic range to support the reduction of the remaining edema.

#### 3<sup>RD</sup> THERAPY SESSION

The edema and erythema was significantly reduced, the pain was reduced and occurred only once during the previous night because of tiredness. TR-Therapy in capacitive and resistive thermic mode was applied to support healing processes of the tissue. At the end of the session, athermic capacitive therapy was applied to support lymph drainage of the area. Additional active and stabilization exercises were done.

#### 4<sup>TH</sup> THERAPY SESSION

Patient had nearly no difficulties. The same therapy pattern as in the 3<sup>rd</sup> therapy session was applied and the case was closed.



Before the 1<sup>th</sup> therapy



After the 4<sup>th</sup> therapy



Clinical case by: **Monika Házová, M.Sc.**  
Physiotherapist

# TR-THERAPY

## CLINICAL CASE

### IMPINGEMENT SYNDROME



A female patient age 45 came to the physiotherapist with a diagnosis of impingement syndrome in the right shoulder. After the initial examination and exclusion of other etiologies of pain origin, it was decided that TR-Therapy is to be incorporated. The goal of the therapy is to re-establish the muscle coordination in the shoulder, which will also result in decrease of pain and normal range of motion in the joint. Three therapies were performed altogether in the horizon of two weeks.

#### 1<sup>ST</sup> THERAPY SESSION

##### State prior to the therapy

The patient's problems prior to the first therapy session included pain in the shoulder, sometimes projected into the chest and upper arm, limited range of motion (Table 1) and at looking at the patient elevation and protraction of this joint was observed. The right scapula was instable. Blockage of right ribs was also found.

##### Goal of the therapy

Goal of the therapy is decrease of pain and muscle tone in the right shoulder area, muscle strengthening and improving the position of the whole shoulder girdle.



*Before the 1<sup>st</sup> therapy*

##### Therapy procedure

TR-Therapy was used to treat the upper thoracic spine and the right shoulder area. Therapy initiated in the capacitive mode, continues in resistive mode and finally was performed again in capacitive mode. Patient was laid on her stomach with the neutral electrode placed under her stomach. After the TR-Therapy was finished, mobilization of the ribs and active exercises of the shoulder girdle were performed.

##### TR-Therapy parameters

|  |            |            |            |
|--|------------|------------|------------|
| Therapy mode   | capacitive | resistive  | capacitive |
| Therapy time   | 15 minutes | 15 minutes | 5 minutes  |
| Continuous / pulsed  | continuous | continuous | continuous |
| Intensity on Schliephake scale (Intensity set on the device) | III (36%)  | II (20%)   | I (3%)     |
| Manual techniques used during TR-Therapy                     | -          | -          | -          |

##### State after the therapy

The patient described decrease of pain and decrease of muscle tension which initially caused protraction and elevation of the right shoulder. The range of motion in the shoulder was objectively measured. Increase of range of motion was confirmed (Table 1).

## 2<sup>ND</sup> THERAPY SESSION

### State prior to the therapy

In comparison with the patient's first visit the patient described subjective improvement. Pain in the right shoulder was still present but was more local, without the projections into the chest or upper arm. Position of the right shoulder girdle had improved. Limitation in range of motion is still present (Table 1), but it was lower than upon the first therapy session.

### Goal of the therapy

Goal of the second therapy was to decrease pain and increase range of motion of the shoulder, muscle strengthening to improve the position of the right shoulder girdle.

### Therapy procedure

TR-Therapy was again used to treat upper thoracic spine and the right shoulder area. Therapy started using capacitive mode, continued in resistive mode and finally ended again in capacitive mode. Patient laid on her stomach with the neutral electrode placed under her stomach. After the TR-Therapy session, the therapist performed active training of the right shoulder and mobilization of the right scapula.

### TR-Therapy parameters

|  |            |            |            |
|--|------------|------------|------------|
| Therapy mode   | capacitive | resistive  | capacitive |
| Therapy time   | 15 minutes | 15 minutes | 5 minutes  |
| Continuous / pulsed  | continuous | continuous | continuous |
| Intensity on Schliephake scale (Intensity set on the device) | III (38%)  | II (30%)   | I (3%)     |
| Manual techniques used during TR-Therapy                     | -          | -          | -          |

### State after the therapy

Patient described namely decrease of pain in the right shoulder area. Improved range of motion of the right shoulder was objectively measured as well as the improved position of the shoulder girdle (Table 1).

## 3<sup>RD</sup> THERAPY SESSION

### State prior to the therapy

The patient didn't feel any pain anymore. She only described stiffness in the right shoulder in the morning. Range of motion of the right shoulder was limited only in external and internal rotation. Other movements were without limitations.

### Goal of the therapy

Goal of the therapy was mainly to support muscle coordination in the area of the right shoulder girdle.

### Therapy procedure

TR-Therapy was again used to treat the upper thoracic spine and the right shoulder area. Therapy was performed first in the capacitive mode, then in resistive and finally again in capacitive mode. Patient laid on her stomach with the neutral electrode placed on the stomach. After finalizing the TR-Therapy the physiotherapist performed scapula mobilization and active training of the right shoulder.



*Before the 2<sup>nd</sup> therapy*



*Before the 3<sup>rd</sup> therapy*

### TR-Therapy parameters

|  |            |            |            |
|--|------------|------------|------------|
| Therapy mode   | capacitive | resistive  | capacitive |
| Therapy time   | 15 minutes | 15 minutes | 5 minutes  |
| Continuous / pulsed  | continuous | continuous | continuous |
| Intensity on Schliephake scale (Intensity set on the device) | III (40%)  | II (32%)   | I (3%)     |
| Manual techniques used during TR-Therapy                     | -          | -          | -          |

### State after the therapy

Patient was relieved of pain completely. The range of motion of the right shoulder was reestablished in the full range (Table 1). When looked at, it could be seen that the position of the right girdle was normal again. For successful results the therapy was terminated and the patient was advised on how to exercise at home.

Table 1: Examination of the range of motion in the right shoulder

|                   | 1 <sup>st</sup> therapy session |       | 2 <sup>nd</sup> therapy session |       | 3 <sup>rd</sup> therapy session |                     |
|-------------------|---------------------------------|-------|---------------------------------|-------|---------------------------------|---------------------|
|                   | Before                          | After | Before                          | After | Before                          | After               |
| Flexion           | 90°                             | 100°  | 120°                            | 130°  | Without limitations             | Without limitations |
| Extension         | 30°                             | 40°   | 40°                             | 40°   | Without limitations             | Without limitations |
| Abduction         | 45°                             | 55°   | 70°                             | 70°   | Without limitations             | Without limitations |
| Adduction         | 20°                             | 40°   | 50°                             | 60°   | Without limitations             | Without limitations |
| External rotation | 20°                             | 35°   | 45°                             | 60°   | 90°                             | Without limitations |
| Internal rotation | 20°                             | 35°   | 40°                             | 50°   | 70°                             | Without limitations |



Clinical case by: **Monika Házová, M.Sc.**  
Physiotherapist



