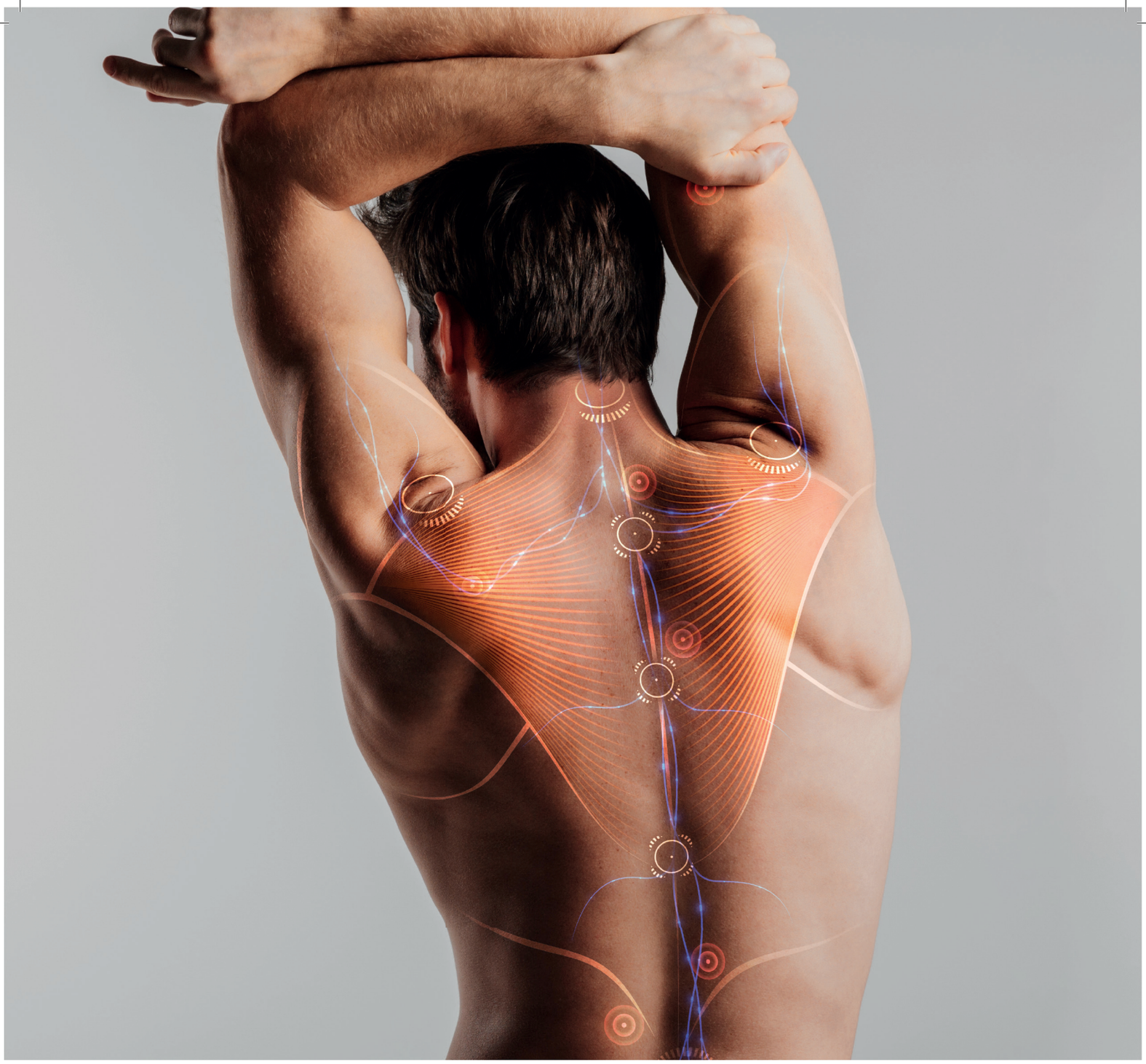


Winback White Paper

EN

- About Winback Technology
- CNRS and Winback project
- Retrospective Study
- Clinical Cases
- Scientific Literature

WINBACK ACADEMY

A global success story

About Winback

Founded in France in 2013, the Winback Group has become the world leader in non-invasive technologies for rehabilitation and high-level sport.
Today, Winback manufactures new-generation radiofrequency devices.

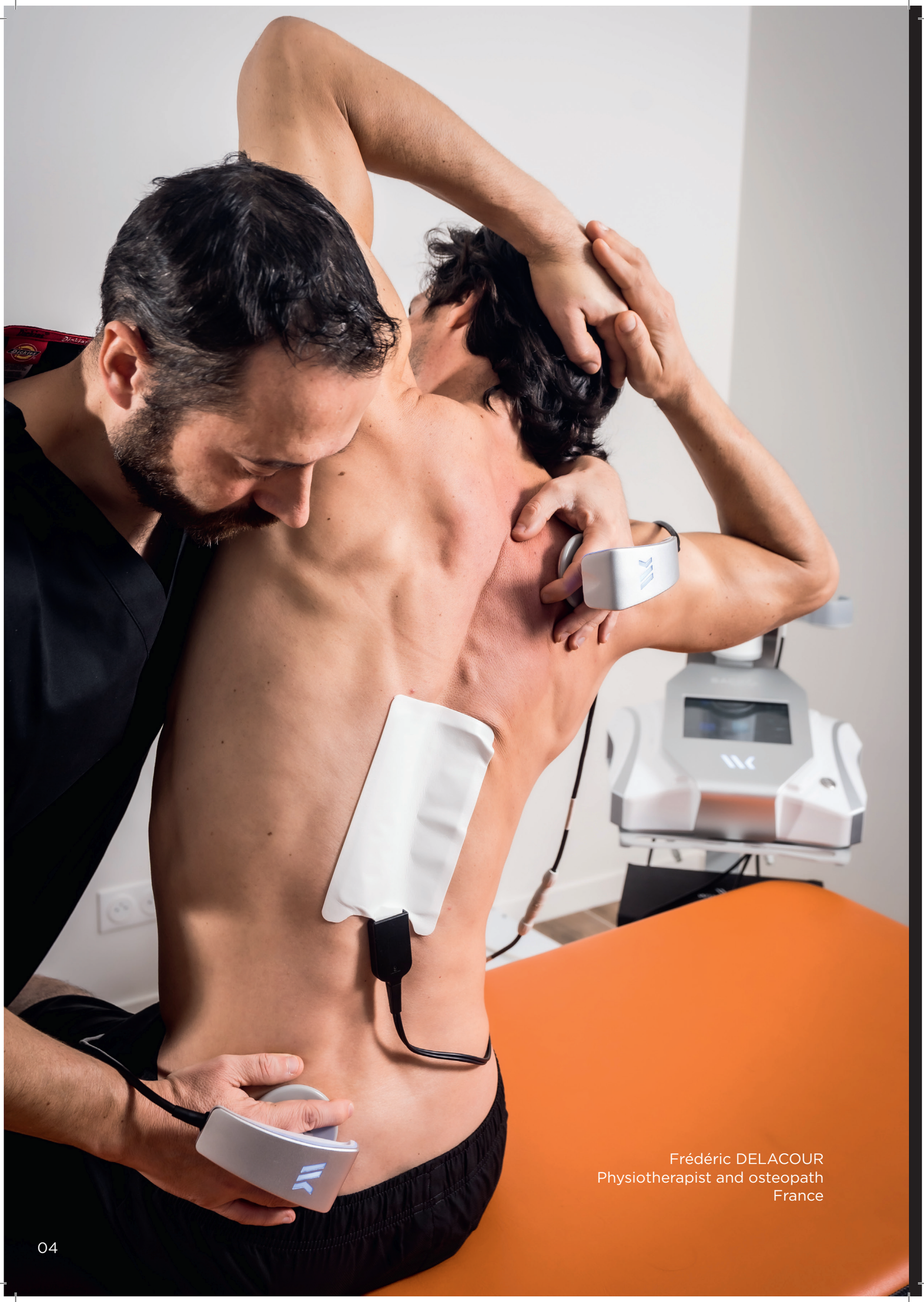
Winback Academy

By enrolling in the Academy, you'll have access to studies, protocols, videos and training courses designed to support your integration of Winback tech to perfect your area of expertise, including physiotherapy, sports, women's health, wellness, aesthetics, and veterinary medicine.

- **55** countries powered by Winback technology
- **180** employees worldwide
- **15,000** devices installed worldwide
- **500** sports clubs and federations medical teams equipped
- **300** hospitals and clinics equipped

Summary

Winback,
non-invasive innovations,
providing a comprehensive
care pathway



Frédéric DELACOUR
Physiotherapist and osteopath
France

About **Winback** Technology

01

Winback combines three frequencies in a single treatment to amplify therapeutic results.

TECAR current - Radiofrequency (RF) / High frequency

Winback TECAR/RF is an electrical current that operates at high-frequencies between 300kHz and 1000kHz.

- **Capacitive Current (CET):** from 300 kHz to 500 kHz for local action on soft tissue with high water density.
- **Resistive Current (RET):** from 300 kHz to 500 kHz to target deep, hard tissue with low water content.
- **Mix Current:** from 1000 kHz for action on fibrous tissue, scars and skin.

In this frequency spectrum, this current has three major effects:

1. **Biological**: membrane Depolarization caused by RF induces the opening of ion channels, accelerating intra- and extra-cellular exchanges, which supports cellular health and repair.
2. **Analgesic**: the current causes saturation of synaptic connections through the synthesis of neurotransmitters, providing pain relief lasting from 12 to 24 hours.
3. **Diathermic**: depending on the intensity, varying degrees of heat will be generated within the tissues, promoting vasodilation, fluidity of the fasciae and the release of tension.

Hi-EMS current – Medium frequency

Hi-EMS current is a 1500Hz or 4000Hz current modulated to induce electro-myostimulation. These frequencies have the unique advantage of reducing skin impedance, making muscle stimulation more comfortable and deeper.

Hi-EMS currents are mainly based on Focal current (recruitment of deep muscles) or Radial current (recruitment of superficial muscles)

Hi-TENS current - High frequency RF modulated at low pulse rates

The Hi-TENS current uses a modulated high-frequency RF current to generate transcutaneous electrical nerve stimulation to achieve analgesic effects:

- Hi-TENS 25Hz provides immediate local relief, good for acute pain.
- Hi-TENS 2/5Hz provides longer-term relief, good for persistent or chronic pain.

NEUROSTIMULATION

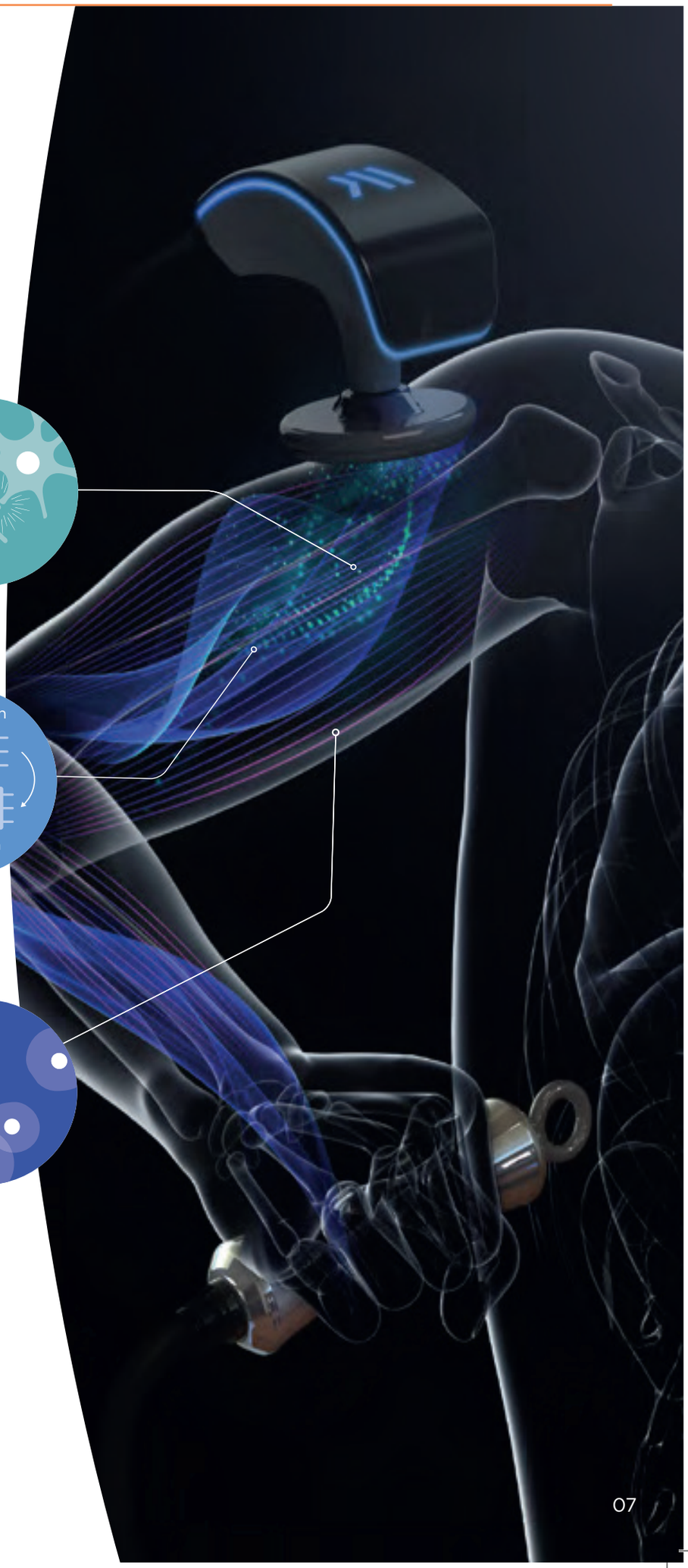
Hi-TENS for immediate pain management

ELECTROSTIMULATION

Hi-EMS for deep muscle and circulatory action

BIOSTIMULATION

RET for metabolic action



Musculoskeletal disorders

Release tension, promote vascularisation, and increase elasticity to improve tissue vitality and regeneration in acute and chronic pathologies.

Pain relief

Aid with pain, inflammation, and stiffness.

Traumatology

Reduce pain and manage inflammation and edema for injuries like sprains, fractures, or muscular truama.

Rheumatology

Joint maintenance and pain relief for rhematic conditions like tendinopathies, neck pain, lumbago, or capsulitis.

Sports physiotherapy

Support recovery from and prevention of future acute and chornic conditions through tissue preparation, tension relief, and vascularisation.

Pelvic and perineal surgery

Pelvic pain, climacteric disorders during perimenopause, sexual and urinary problems and postpartum rehabilitation.

Physio-aesthetics

Reduce cellulite and stretch marks, firming for abdominals and glutes, and facial treatments.

Veterinarian

Rehabiliation treatments for the veterinary population, including orthopedic recovery and massage.

CNRS and **Winback** Project

02

In vitro studies of Winback technology, in collaboration with the CNRS

The CNRS (National Center for Scientific Research) is France's largest public research organization. It conducts multidisciplinary scientific research across fields such as physics, biology, chemistry, social sciences, and humanities. The CNRS aims to advance knowledge, support innovation, and collaborate with universities, industries, and international partners to address global scientific and societal challenges.

Objective: This study aims to evaluate and develop new advanced ultrasound imaging techniques for the morphological and functional characterisation of superficial tissue structures, particularly the different layers of the skin and underlying muscles.

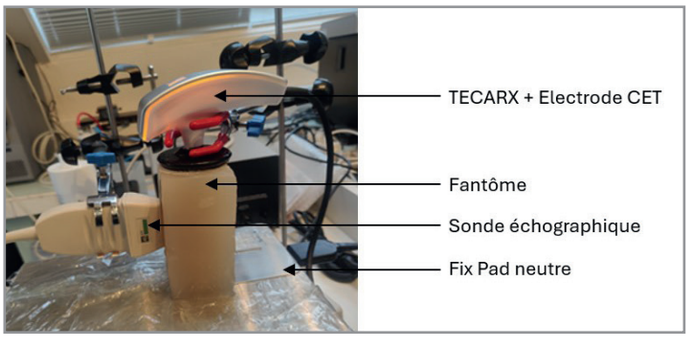
Methodology: Biomimetic tissue phantoms were created using agar-agar enriched with sodium chloride (NaCl) in order to reproduce in a controlled manner the dielectric properties and bioelectrical impedance of human skin and muscle tissue. These phantoms were designed to offer structural heterogeneity comparable to that of real biological tissues.

The BACK4 device was used to deliver electro-biocompatible waves at different frequencies, with the aim of studying their influence on ultrasonic propagation and the electromechanical response of the modelled mediastudy their influence on ultrasonic propagation and the electromechanical response of the modelled media.

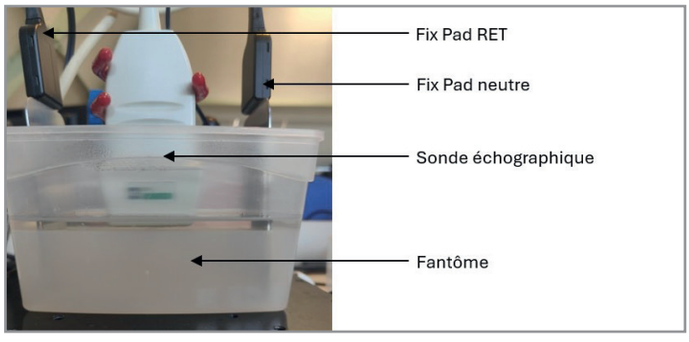
At the same time, an ultrasonic search system, based on a multi-frequency acquisition platform (linear probes between 5 and 15 MHz), was used to enable experimental data to be recorded in B-mode, as well as in Doppler and radio frequency (RF) mode, as required.

The acquisition parameters were standardised for each trial: centre frequency, gain, imaging depth, and frame rate were rigorously controlled. Particular attention was paid to the repeatability of measurements and the thermal stability of phantoms during acquisition sessions.

All experiments were conducted at the Biomedical Imaging Laboratory (LIB – UMR 7371), located on the Cordeliers Campus of Sorbonne University, in partnership with WINBACK.



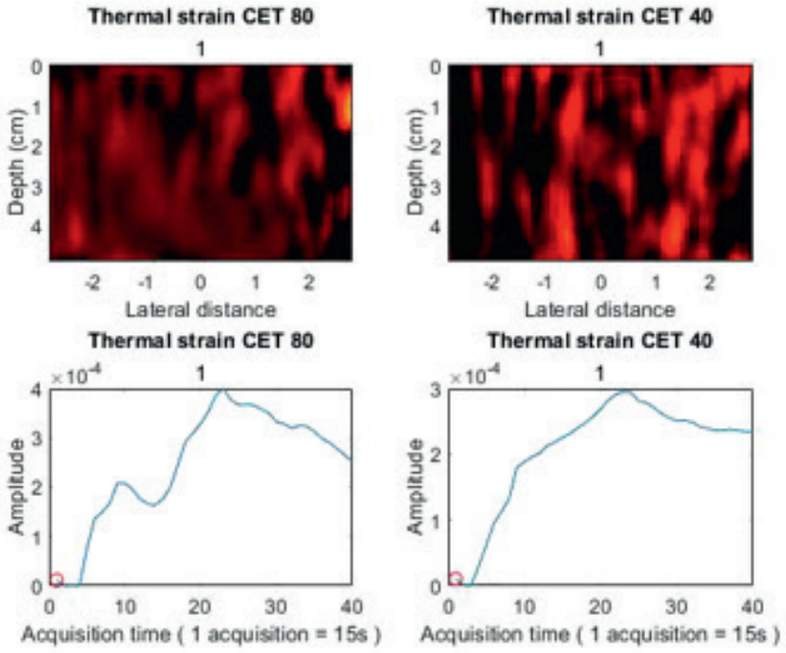
Ghost image CET



Ghost image RET

Experiment 1: Observation of the CET effect

In this first experiment, we compared the effect of capacitive mode (CET) depending on intensity. We compared intensities of 40% and 80% for Soft mode (500 kHz).

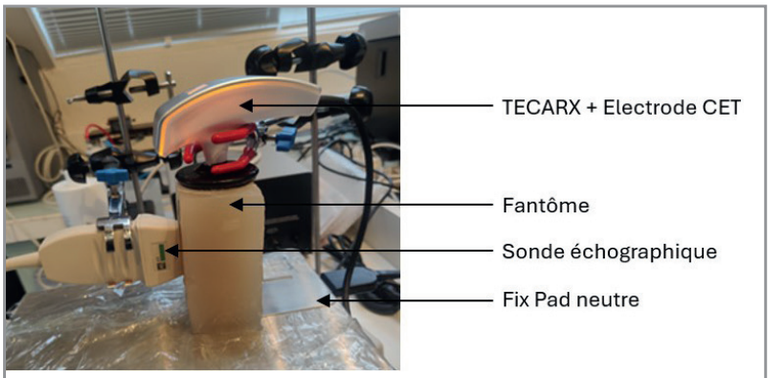


Results

The results show that at 80% intensity, temperature rises significantly faster and to a greater amplitude, demonstrating a direct correlation between the level of intensity applied and the heating dynamics of the medium being tested.

Experiment 2: Influence of CET frequency on depth action

Objective: In order to assess the influence of frequency as a function of depth, a second series of experiments was conducted using different capacitive modes (CET). The ultrasound probe was initially positioned on the surface of the phantom in order to analyse the variations observed in the area between 0 and 3 cm deep. It was then placed at the centre of the phantom to study the thermal and acoustic changes between 3 and 6 cm deep. The intensity applied during these measurements was set at 80% in CET mode.



Ghost image CET

Methodology:

1. High probe position:
   CET Soft vs CET Deep
2. Probe mid-position:
   CET Soft vs CET Deep
3. CET Soft:
   high position vs middle position
4. CET Deep:
   high position vs middle position

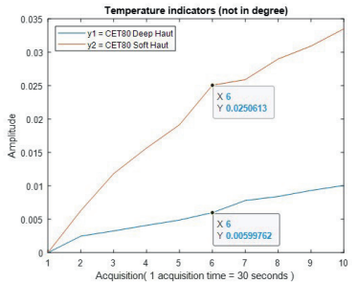
Results: In the high position (0–3 cm), CET Soft mode (500 kHz) induces a greater temperature increase than CET Deep mode (300 kHz).
However, in the lower position (3–6 cm), CET Deep mode (300 kHz) generates a more significant increase in temperature than CET Soft mode (500 kHz).

Conclusion

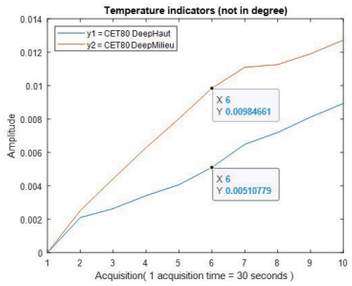
The results confirm that the frequency of the capacitive current significantly influences the depth of thermal action.

At 500 kHz (Soft mode), heating is greatest at the surface (0–3 cm), with a gradual attenuation of the effect at depth.

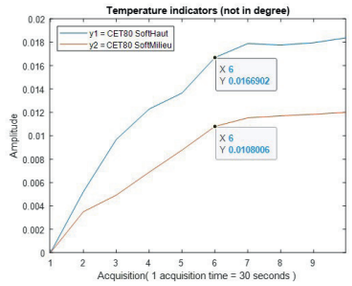
At 300 kHz (Deep mode), the temperature increase becomes more noticeable at greater depths (3–6 cm), indicating better energy penetration into deep tissue.



Deep ghost image CET
soft vs deep high



Deep ghost image CET
deep high vs medium

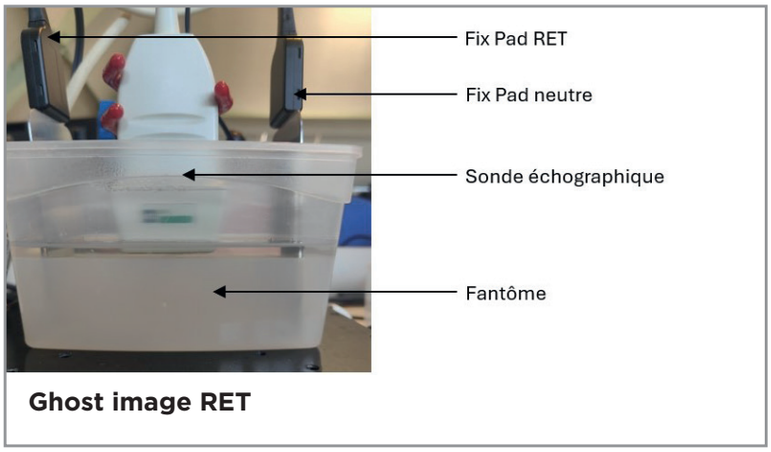


Deep ghost image CET soft high vs medium

Experiment 3: Comparing the effect of RET resistive mode based on tissue resistance

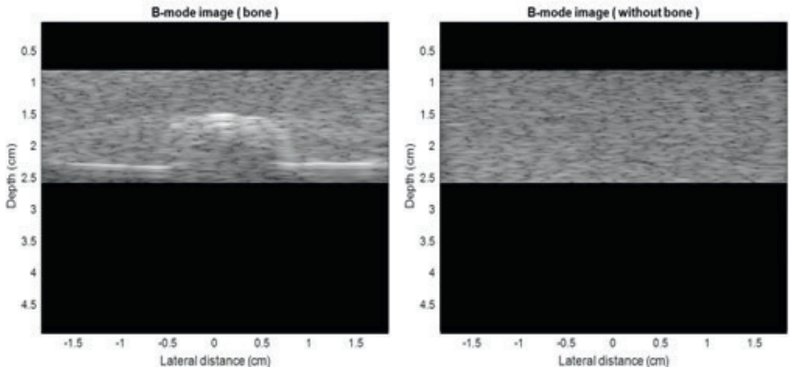
Objective: To demonstrate that RET mode targets resistive tissues.

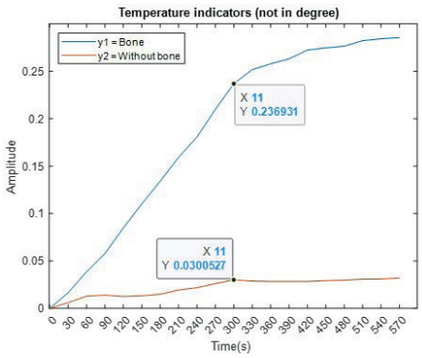
Methodology: Test on a phantom containing a bone in its centre and a phantom without a bone. The parameters used were as follows: RET 90% + Hi-TENS 25Hz.



Ghost image RET

Results: After 5 minutes of application, a significant increase in temperature was observed at the bone interface. The thermal amplitude measured near the bone was approximately seven times higher than that recorded in the phantom without bone structure. This observation suggests increased localised heating linked to the presence of more resistive tissue.





Conclusion

The results confirm that tissue resistance directly influences current distribution in resistive mode (RET). In particular, the presence of bone tissue, which has high resistance, promotes local current concentration, resulting in significantly greater thermal heating at this level.

General conclusion of the experiments Winback in collaboration with the CNRS

All of the experiments carried out have made it possible to better characterise the effects of high-frequency TECAR (Transfer of Energy Capacitive and Resistive) currents within simulated skin and muscle tissue. The observations obtained validate several fundamental principles of this therapeutic modality:

Capacitive mode (CET) at 500 kHz produces a greater thermal effect on the surface (0–3 cm), while at 300 kHz, the heating spreads deeper (3–6 cm).

Deep mode (300 kHz) reaches a steady-state thermal condition more quickly than Soft mode (500 kHz), suggesting increased efficiency in deeper layers.

Resistive mode (RET) generates a more intense action in tissues with high resistance, such as bone structures.

- Ultimately, in vivo validation will be essential to transpose these results to real physiological conditions. The human body, being composed of tissues with heterogeneous electrical properties and complex physiology, will require further investigation to refine the models and confirm the mechanisms observed.

- Finally, thermal deformation imaging coupled with radiofrequency analysis has great potential for identifying pathologies that alter the electrical permittivity of tissues. Among the promising clinical applications, this approach could enable the localisation of abnormalities such as excessive accumulation of adipose tissue as opposed to hydrated regions, thereby contributing to a more accurate differential diagnosis.

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Dr Simona Simone
Physiotherapist and osteopath
Italy

Retrospective Study **Winback**

03

Retrospective study (2022 to 2025): efficacy and safety of BACK4 in pain management

A retrospective study conducted between January 2022 and May 2025 evaluated the use of the BACK4 device, combining TECAR therapy (radiofrequency) and medium-frequency muscle stimulation (Hi-EMS) and low-frequency Hi-Tens, in the treatment of acute and chronic pain. The main objective was to measure its effectiveness in reducing pain, as well as its tolerance in clinical practice.

Methodology

Type of study: observational, non-interventional.
Population: 89 patients (50 women, 39 men), average age 46.6 years.
Main indications: low back pain (21%), knee trauma or surgery (20%), tendinopathies (16%), musculoskeletal disorders (13%), other inflammatory and traumatic conditions.

Table 1. General characteristics of patients (N = 89)

Variables	Data
Female	50
Male	39
Age (y)	46.6 ± 17.3 (range 18–87)
Common indications treated	
Acute and chronic low back pain	21%
Knee injury and post-operative knee surgery	20%
Tendinopathy	16%
Musculoskeletal disorders	13%
Inflammatory conditions	8%
Sprains	7%
Fractures	6%
Pelvic floor and abdominal pain	4%
Shoulder dislocation	4%

Values are presented as mean ± standard deviation, number and percentage.

Protocol: an average of eight 25-minute sessions, at a rate of two to three sessions per week, carried out by physiotherapists.

Results

Pain: significant improvement, with an average VAS score decreasing from 4.0 to 0.8 at rest and from 7.0 to 1.2 during movement ($p<0.0001$).

Table 2. Mean VAS scores at rest and while moving

Variables	Baseline	After total sessions	p-value
VAS score at rest	4 ± 2.4	0.8 ± 1.3	<0.0001
VAS score while moving	7 ± 1.9	1.2 ± 1.5	<0.0001

Values are presented as mean ± standard deviation.

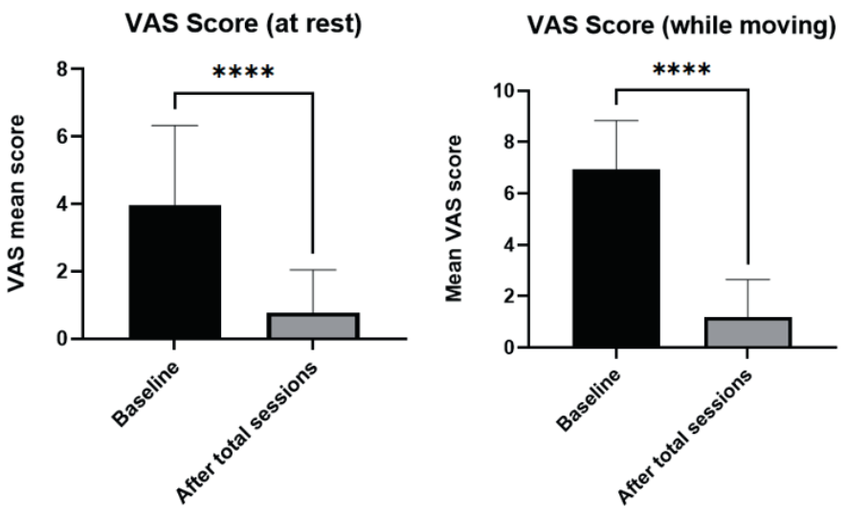


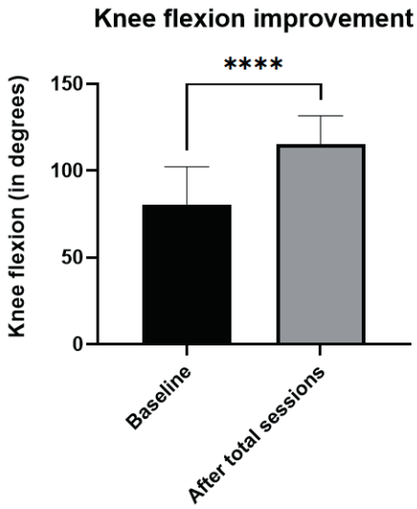
Figure 1. Mean VAS scores. ****p<0.0001

Mobility: significant functional improvement:
Knee flexion: from 80.3° to 115.3° after treatment (p<0.0001).

Table 3. Mean knee flexion in degrees

Variables	Baseline	After total sessions	p-value
Knee flexion (°)	80 ± 22.0	115.3 ± 16.3	<0.0001

Values are presented as mean ± standard deviation.

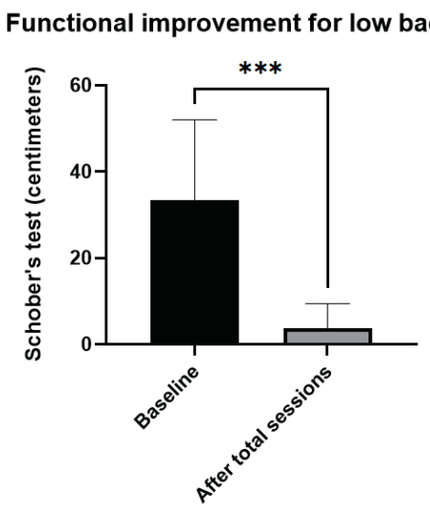


Schober's test for low back pain: statistically significant improvement (p<0.001).

Table 4. Schober's test in centimetres

Variables	Baseline	After total sessions	p-value
Schober's test (cm)	33.3 ± 18.7	3.8 ± 5.7	0.0008

Values are presented as mean ± standard deviation.

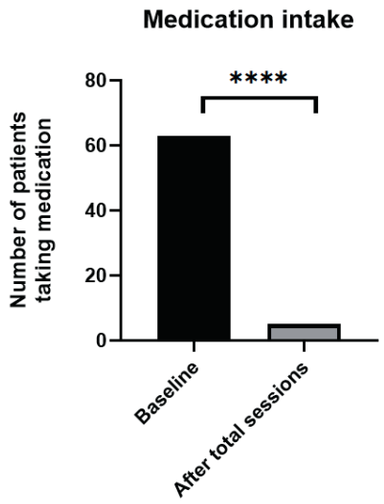


Quality of life (SF-36, n=26): increase from 81.0 to 87.2 points (p=0.001).
Medication use: decrease from 70.8% of patients to only 5.6% (p<0.0001).

Table 6. SF-36 score

Variables	Baseline	After total sessions	p-value
Medicationintake, n (%), n = 89	63 (70.8)	5 (5.6)	<0.0001

For binary variables (yes vs no), values are presented as numbers (percentages).

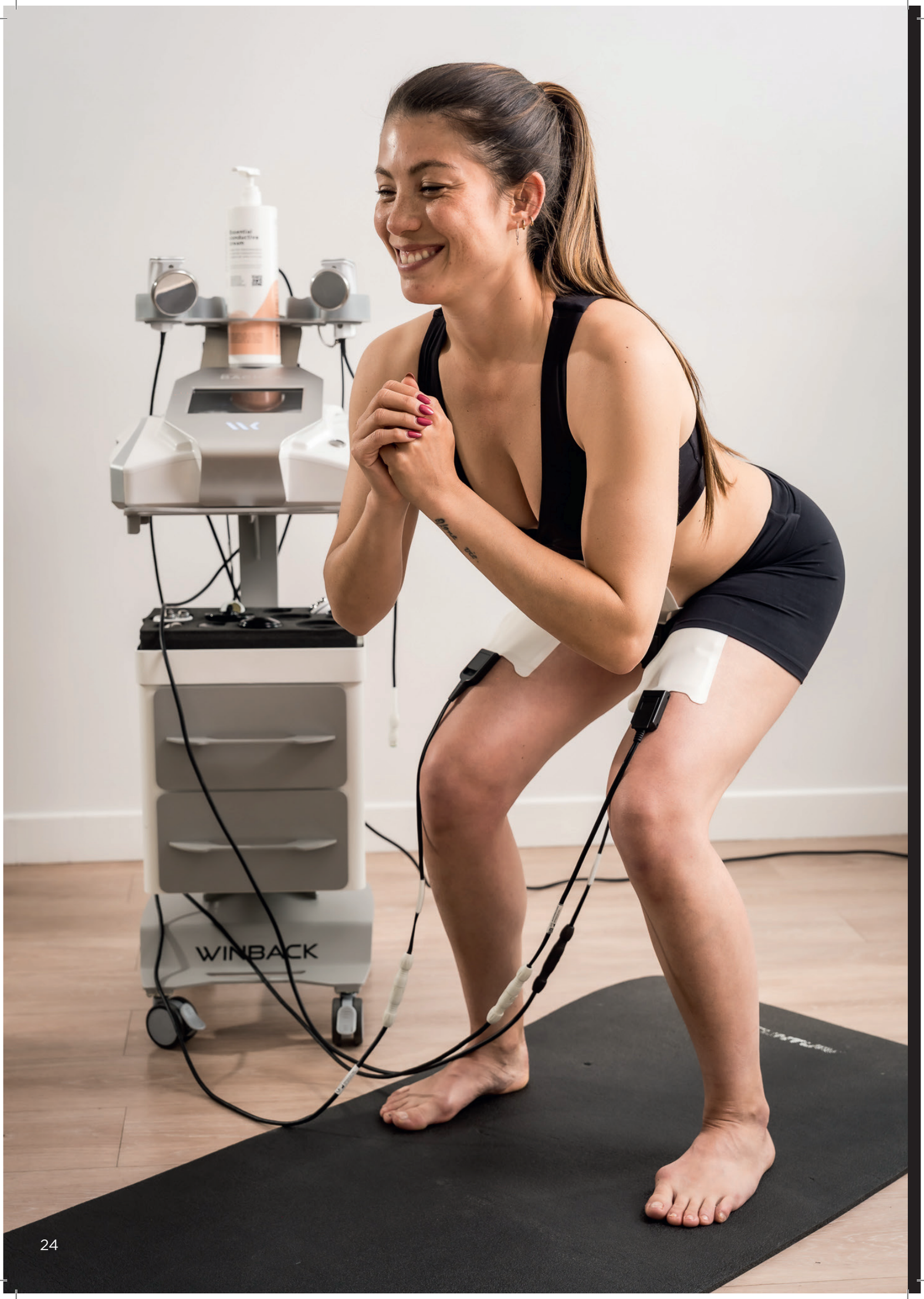


Safety: no adverse effects or incidents reported. Tolerance was excellent.

Conclusion

This retrospective study of 89 patients over approximately three years confirms that the BACK4 device is safe and effective in treating various musculoskeletal pains. It significantly reduces pain and improves mobility and quality of life, while reducing the need for medication.

However, the authors highlight the limitations associated with the absence of a control group and the heterogeneity of the indications.


WINBACK

Clinical cases **Winback**

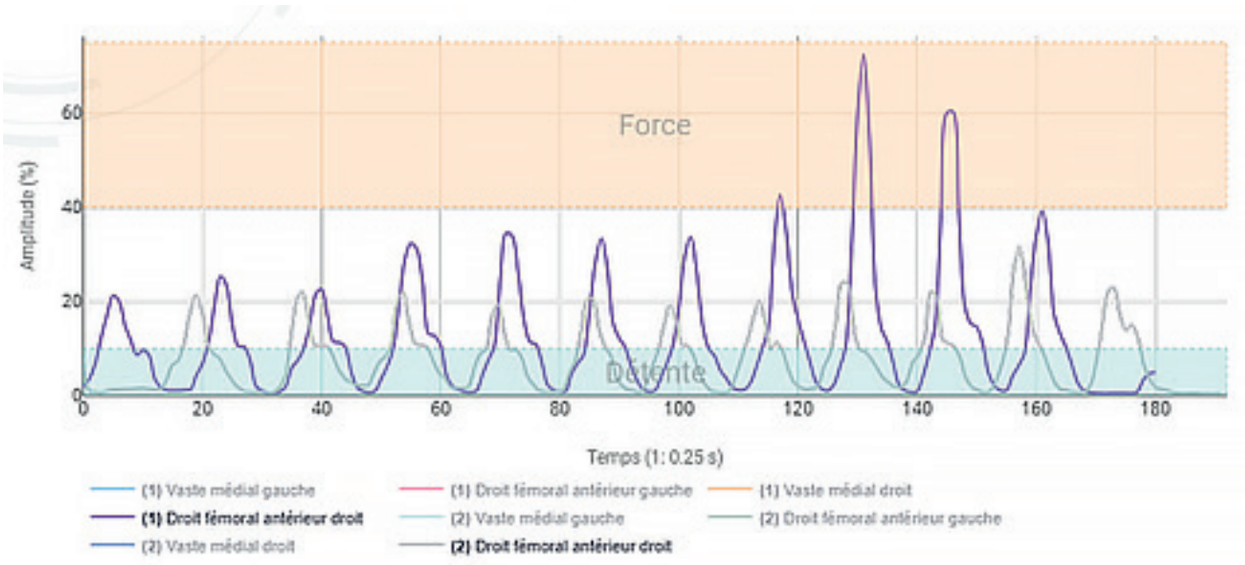
04

Clinical case study on a complete ACL rupture using Winback Resistive (RET), and Hi-EMS Radial currents

Objective

- Compare the level of activation of the vastus medialis and rectus femoris muscle fibres during a squat.
- Compare the level of activation of the muscle fibres in the vastus medialis and rectus femoris during an isometric contraction (knee in extension).
- Compare the level of muscle fibre activation in the vastus medialis and rectus femoris by stimulating the femoral nerve and the muscle heads of the vastus medialis and rectus femoris.

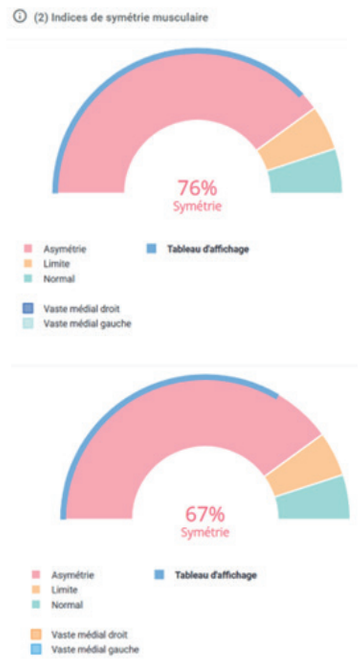
Observation of the impact of Hi-EMS current on muscle recruitment in a patient with a complete ACL rupture.



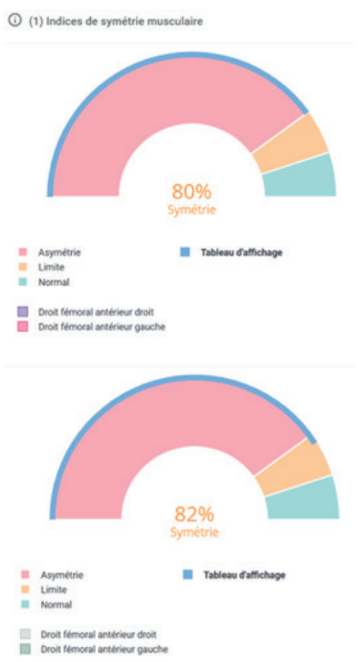
Results

Stimulation with 10% radial Hi-EMS results in a higher level of activation (percentage of maximum voluntary isometric contraction, MVIC) than any other exercise (squats, isometric exercises or knee extensions)

Extensive medial



Right femoral



Christian de PERETTI
Physiotherapist and osteopath
France

Clinical case of a biceps femoris injury using Winback Resistive (RET) and Rehab+ hands-free currents

Objective

- Compare the level of activation of the biceps femoris and semitendinosus muscle fibres during isometric contraction (knee flexion).
- Observation of the impact of Hi-EMS current on muscle recruitment in a patient with a biceps femoris injury.

Winback Back 4 was used with the following settings:
- **Mode:** RET 30% + Hi-EMS Rehab+ 50%
- **Stimulation duration:** 15 minutes

Current type:
High-frequency resistive current (RET) combined with Hi-EMS, a medium-frequency current, 1.5 to 4 kHz) delivering low-frequency pulse trains (1.5 to 100 Hz).

This combination enables deep muscle recruitment without pain, with superior performance compared to conventional low-frequency EMS currents.

Application

Two adhesive electrodes were placed on the hamstrings to deliver the electrostimulation current. The test was performed with the patient in the prone position, knee flexed, in a voluntary isometric contraction position.

Measurement

Muscle activity was measured using an electromyographic device (EMG) device, enabling a comparative analysis of the level of activation of the biceps femoris and semitendinosus muscle fibres, with and without the application of Hi-EMS current.

Results

The results showed an improvement in the activation of the biceps femoris and semitendinosus muscles after treatment in the before-and-after analysis.

Tableau des résultats

	Blessé	Moyenne RMS	Max. contraction du test	Max. contraction historique	Contraction maximale de référence
(1) Biceps fémoral gauche		13.00 %	189.14 µV (40.81 %)	463.41 µV	463.41 µV
(1) Semitendineux gauche	x	16.85 %	417.05 µV (127.80 %)	472.56 µV	326.33 µV
(1) Biceps fémoral droit		17.49 %	346.82 µV (81.62 %)	542.16 µV	424.92 µV
(1) Semitendineux droit		10.63 %	354.13 µV (71.92 %)	549.97 µV	492.41 µV
(2) Biceps fémoral droit		13.40 %	373.07 µV (87.80 %)	542.16 µV	424.92 µV
(2) Semitendineux droit		12.98 %	415.11 µV (84.30 %)	549.97 µV	492.41 µV
(2) Biceps fémoral gauche		19.24 %	387.57 µV (83.63 %)	463.41 µV	463.41 µV

EMG data showed a significant improvement in muscle recruitment after application of the Hi-EMS protocol.

Muscle	EMG activation variation (%)	Variation in maximum contraction (%)
Biceps femoris	+6%	+43%
Semi-tendineus	+8%	+17%

Clinical case study on trigger point release using Winback Hi-TENS current

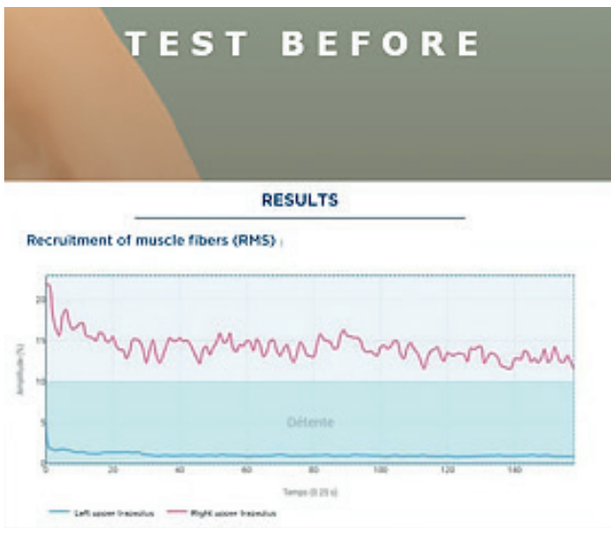
Objective

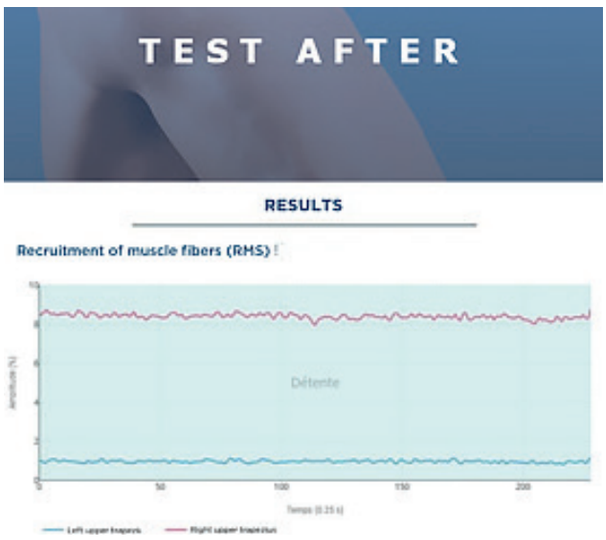
- Observe the effects of Hi-TENS current on trigger point release (decrease in neuromuscular activity).
- Determine the possibility of reducing neuromuscular activity by acting directly on a trigger point using the Hi-TENS 5Hz current.

Observations

The day before, we asked the patient to perform pre-fatigue shrug exercises until failure in the upper trapezius. The next day, we measured the neuromuscular activity at rest (baseline tone) of the right and left upper trapezius muscles.

Neuromuscular activity at rest was again observed after Hi-TENS stimulation using EMG.

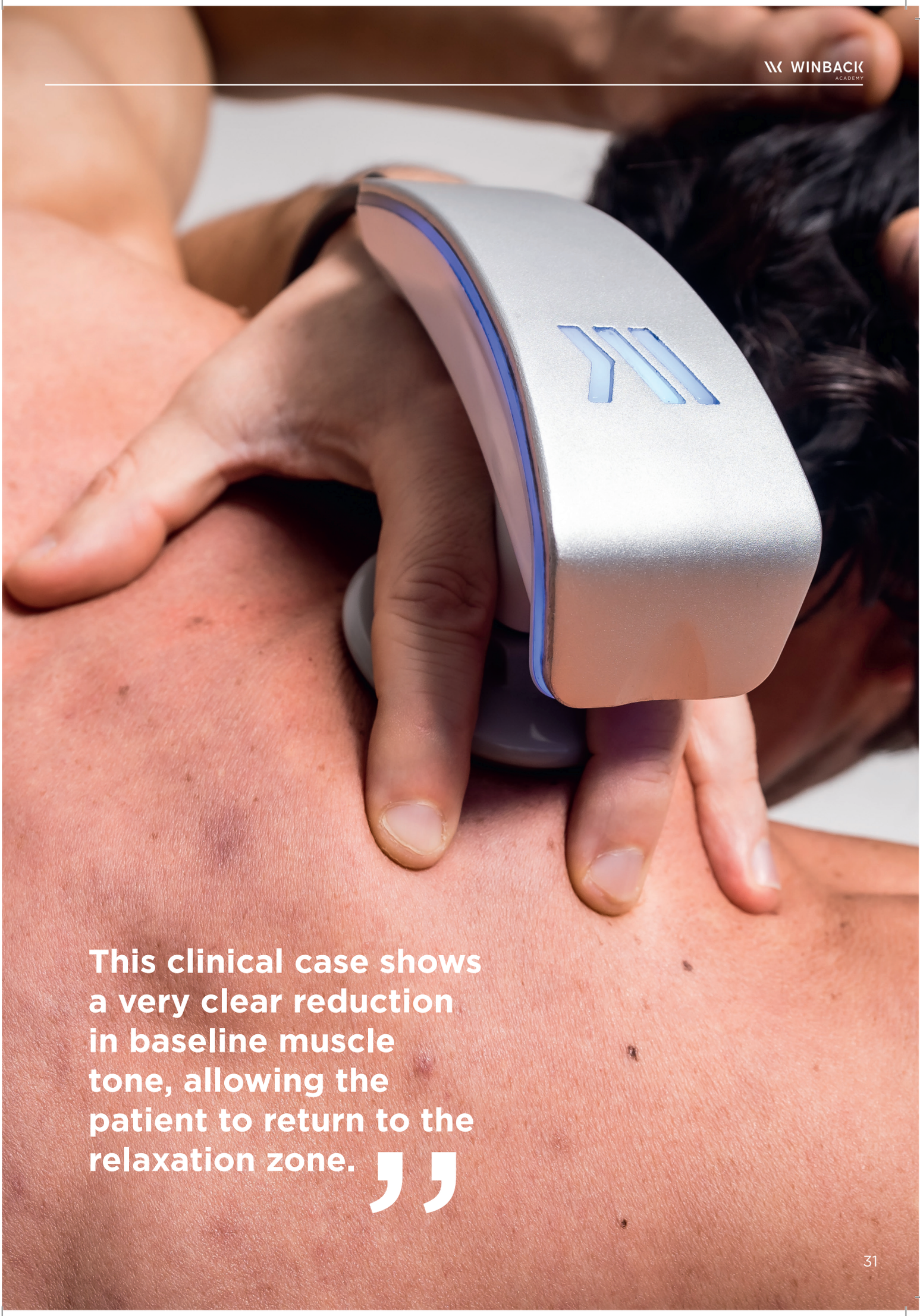




› **Significant reduction in baseline muscle tone**, allowing the patient to return to the relaxation zone.

The tone of the right upper trapezius remains slightly higher than on the contralateral side, but is considered normal as it is the dominant limb.

› **Significant reduction in activity after Hi-TENS 5Hz treatment, enable for the patient to return to normal (relaxation tone).**



This clinical case shows a very clear reduction in baseline muscle tone, allowing the patient to return to the relaxation zone.”

Scientific literature **Winback**

- Physiological effects
- Effects on pain
- Cellular effects
- Aesthetic effects
- Effects on range of motion
- Placebo effects

05

Physiological effects of high-frequency currents

Several studies have been conducted on cadaveric tissue. The main objective was to analyse the thermal effects of electric current and its transmission through different types of tissue. As illustrated in the images, internal measurements were taken usingusing digital thermometers and thermocouples, while electrical current analyses were performed in capacitive or resistive mode.

The tests were conducted on various areas, including the musculotendinous junctions, the elbow, the shoulder, as well as the gastrocnemius, hamstring and quadriceps muscles. These studies provide a better understanding of how electrical current influences tissue temperature and conductivity, which is essential for optimising therapeutic or experimental applications in the field of physiology and medicine.

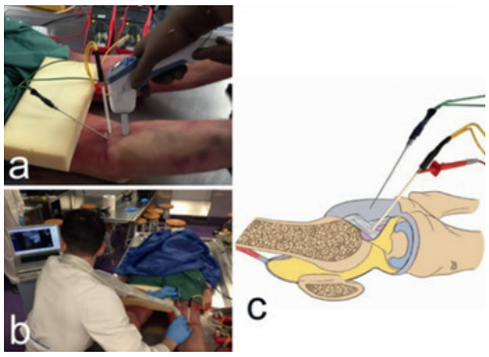


Figure 1
Thermal and non-thermal effects of capacitive-resistive electric transfer application on different structures of the knee: a cadaveric study.
Jacobo Rodríguez-Sanz et al
DOI: 10.1038/s41598-020-78612-8

Scan this QR code and access the study

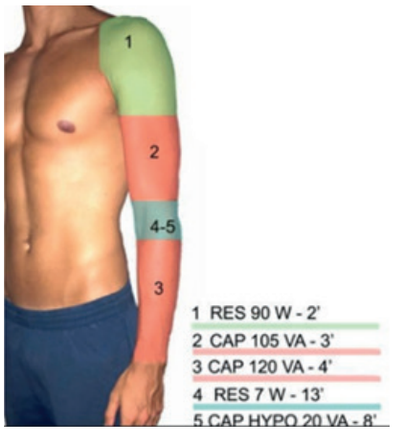


Figure 2
Temperature and current flow effects of different electrode placement in shoulder capacitive-resistive electric transfer applications: a cadaveric study.
Jacobo Rodríguez-Sanz et al
DOI: 10.1186/s12891-020-03918-7

Scan this QR code and access the study

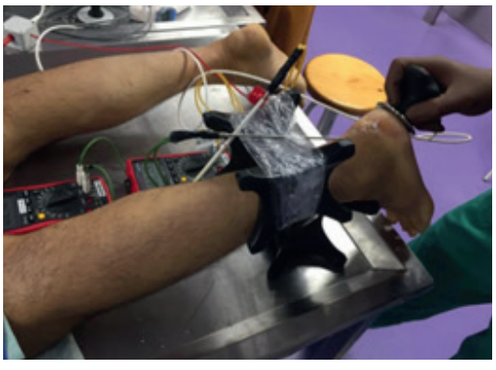


Figure 3
Thermal and non-thermal effects of capacitive-resistive electric transfer application on the Achilles tendon and musculotendinous junction of the gastrocnemius muscle: a cadaveric study.
Carlos López-de-Celís et al

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We observed that when a capacitive current was applied, there was a significant increase in superficial skin temperature. In contrast, resistive current caused an increase in temperature across all tissue layers, from the surface to the deep layers. Thermal effects were even observed at a distance from the active electrode site. These variations were statistically significant: as the intensity increased, so did the tissue temperature.

With regard to current, it was noted that even at low intensities, a high flow rate provided effective stimulation, which may justify the activation of cell proliferation processes, with or without a thermal effect.

The observations can be grouped into four main situations:

1. **Low intensity:** limited heat increase at skin level and on the surface, which could be useful in acute situations, particularly for muscle or tendon pain.

2. **High intensity:** an increase in temperature across all tissue layers, which could be beneficial during chronic phases to remodel and improve tissue viscoelasticity.

3. **Low intensity with deep transmission:** little thermal effect, but current transmission allowing deep stimulation, promoting cell proliferation and healing, particularly in the acute phases.

4. **High intensity:** a significant thermal effect, with current transmission and periarticular thermal increase, which can help improve the viscoelasticity of dense tissues in situations of significant trophic change.

Finally, it was found that the thermal effect diminishes rapidly in all protocols tested, generally in about 5 minutes. These findings are illustrated in the following graph.

This post-thermal observation indicates that the thermal effect is linked to the friction caused by the passage of current, making it an endogenous phenomenon within the tissues.

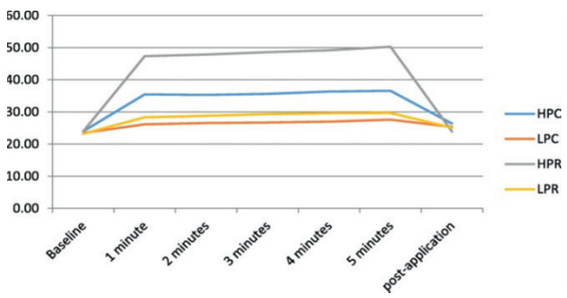

Figure 4
Thermal and non-thermal effects of capacitive-resistive electric transfer application on the Achilles tendon and musculotendinous junction of the gastrocnemius muscle: a cadaveric study.
Carlos López-de-Celís et al

Scan this QR code and access the study

Physiological effects of medium-frequency currents

Optimal frequencies for electrical stimulation using medium-frequency alternating current

Alex R Ward et al
DOI: 10.1053/apmr.2002.33116

Summary

Objective: To determine the effect of single cycles of alternating current at different frequencies on sensory and motor thresholds, as well as on relative thresholds (motor threshold/sensory threshold).

Methodology: Repeated measures design.

Context: Laboratory experimentation.

Participants: Volunteers from among students and university staff (N=16; mean age: 34 years).

Interventions: Single cycles of sine waves, with frequencies ranging from 1 to 35 kHz, were delivered at 50 Hz. The frequencies were applied in random order.

Main evaluation criteria: Motor and sensory thresholds were recorded at each frequency applied.

Results: Sensory and motor thresholds showed a gradual decrease to a minimum at approximately 3 kHz. The relative threshold reached a minimum close to 9 kHz. Comparison with previous studies showed that, although absolute thresholds reached a minimum at a frequency dependent on electrode size, the frequency at which the relative threshold was minimal was independent of the size of the electrodes and the mode of stimulus application (single pulses or burst mode).

Conclusion

The optimal frequency for transcutaneous stimulation using medium-frequency alternating current depends on the measurement criterion selected. It would therefore be desirable for clinical stimulators to offer a choice of carrier frequencies.

Scan this QR code and access the study

Use of Russian and Aussie currents in isometric tetanisation of the quadriceps femoris

E. J. Montenegro et al
DOI:10.1590/1517-869220192502157134

Summary

Objectives: To qualitatively and quantitatively analyse the interaction between Russian and Australian (Aussie) currents during isometric contraction of the quadriceps femoris muscle in the sensory, motor and pain tolerance spectra in young women in good health.

Methods: Subjects were studied at a single time point. A lower limb was randomly selected to receive each current, and electrodes were placed simultaneously on both legs, with a 10-minute interval between each stimulation. Sensory, motor and pain tolerance thresholds were assessed quantitatively (current density in $mA/cm^{2)}$ and qualitatively (VAS).

Results: The subjects were 19 volunteers, aged 22.31 years (±1.29), with a BMI of 21.79 (±1.78). The Australian current reached the sensory threshold with a significantly lower current density compared to the Russian current for the same threshold. The results were significant in the entire group (treatment) for both currents studied in terms of the current density required to reach the three thresholds. However, in blocks (individually), significance was only found for the sensory threshold ($p = 0.0126$). The analysis of discomfort perception, assessed by VAS, showed significant results at all three time points for both currents, but the comparison between them revealed no significant difference.

Conclusion

The Russian and Australian currents are appropriate in terms of the current density required to reach each of the thresholds studied and differ in their interaction with the biological system, with the Australian current requiring less energyhowever, in terms of perceived discomfort, no significant difference was observed between the two currents.

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Effects on pain of high-frequency currents

Analysis of the literature shows that the analgesic effect is the most widely studied area. Indeed, it has been highlighted in approximately 13 studies, some of which, such as those by Palucci (2020) and Mireia Yeste-Fabregat (2021), are particularly noteworthy. These two recent studies are also very interesting for the implementation of a placebo protocol.

A study by Konstantinos Kasimis (2023) also revealed a significant effect of TECAR therapy combined with manual therapy, compared to a non-experimental control group and a group receiving manual therapy alone. Furthermore, in 2023, Joanna Sierenska's study demonstrated the benefits of TECAR therapy in the management of postpartum pain in women who had undergone perineal trauma. The limitation of this study lies in the short duration of care, linked to reduced hospitalisation times. Although an effect on pain was observed, no difference was noted in the consumption of analgesics. Finally, the study by Luigi Brusciano (2023) also points to a beneficial effect of TECAR therapy on anorectal pain.

TABLE 3. Percentages of patients with clinical improvement after treatment.

Element	Patients improved after RFD+BFB	Percentage
VAS SCALE	24/30	80%
CRAIQ-7	27/30	90%
Buttock / adductor synergies	21/30	70%
Abdominal synergies	30/30	100%
Diaphragmatic breathing	27/30	90%

RFD: radiofrequency diathermy; BFB: mano-metric biofeedback; HRAM: high resolution anorectal manometry. Vas Scale: (0–10); CRAIQ-7: questionnaire on the impact of colorectal and anal pathologies on quality of life.

Figure 1
Effectiveness of perineal pelvis rehabilitation combined with biofeedback and radiofrequency diathermy (rdf) in anorectal functional pain syndromes associated with paradoxical contraction of the levator ani muscles. A prospective study.
Luigi Brusciano et al
DOI: 10.1590/S0004-2803.20230222-150

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TECAR therapy has proven beneficial in the treatment of myofascial pain.”

Aurore CHAMBAUDU
Physiotherapist and osteopath
France

It has also been shown that TECAR therapy can be beneficial in the management of myofascial pain (Parisa Taheri, 2023), particularly when it is combined with specific treatment and exercises. In addition, the use of TECAR therapy is beneficial in preventing pain associated with eccentric exercise (Masatoshi Nakamura, 2022), by preventing loss of range of motion and function in the patient.

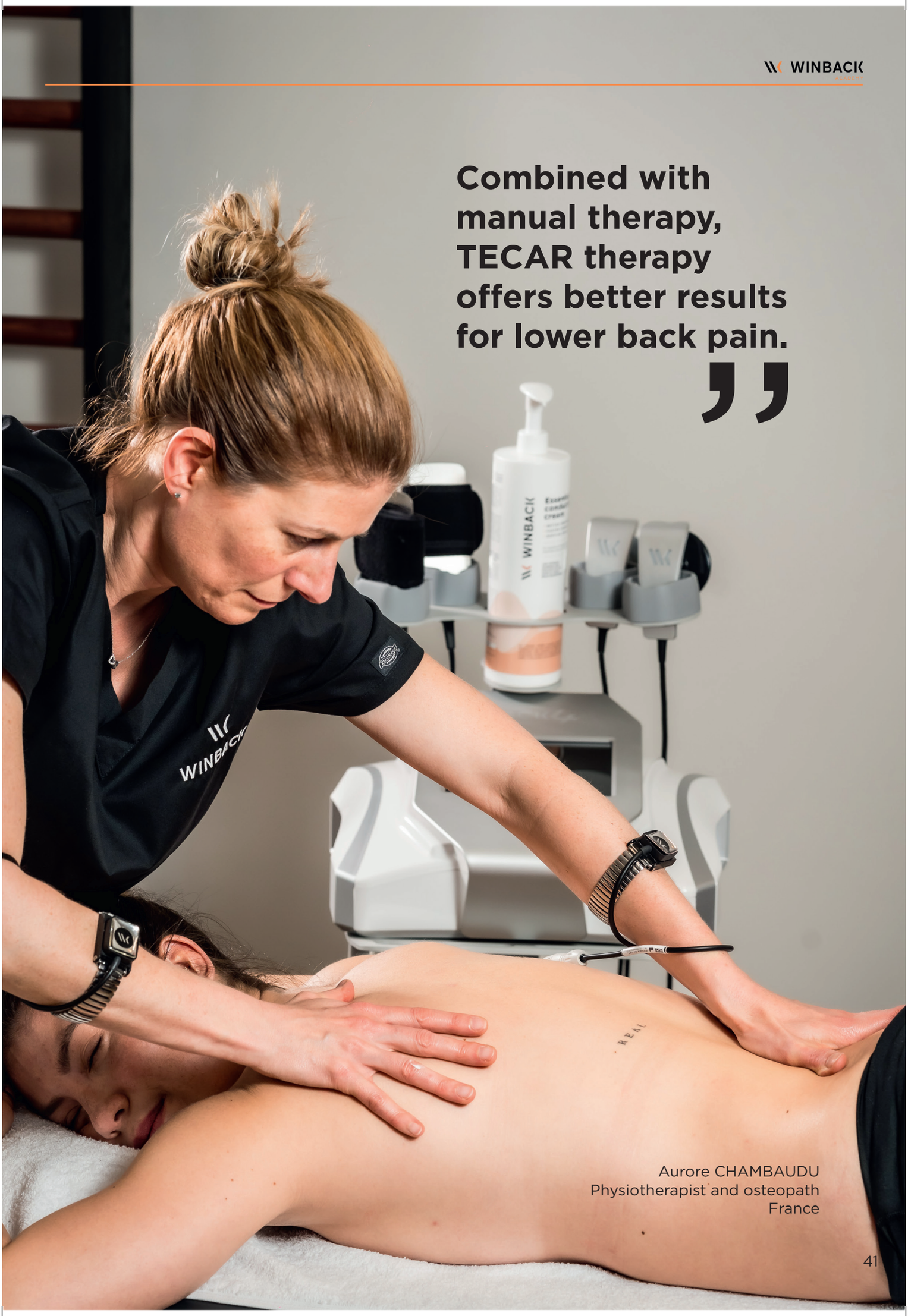
Several interesting studies have been conducted on the main pathology in sports medicine: low back pain. For example, Michio Wachi's study (2022) highlights the rapid effect of TECAR therapy on pain reduction, without remove observing a significant impact on the spinal muscles. However, these results should be qualified, as this study concerns the use of TECAR therapy alone, as opposed to a combination of TECAR, Hi-EMS and Hi-TENS frequencies, as offered by Winback.

		Intervention group		Sham group	
		Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
VAS (mm)		45.63 ± 23.52	9.38 ± 10.16*	47.22 ± 25.50	44.56 ± 29.42
Muscle stiffness	Superficial multifidus	8.84 ± 13.34	0.76 ± 0.54*	9.52 ± 8.96	10.02 ± 9.42
	Deep multifidus	13.74 ± 10.70	1.41 ± 1.21*	12.56 ± 14.90	12.56 ± 14.91
Muscle activity	CLT	1.16 ± 0.82	1.76 ± 2.45	1.25 ± 1.02	1.40 ± 1.42
	ICLL	2.19 ± 1.97	3.95 ± 7.15	2.54 ± 2.35	2.40 ± 2.81
	MF	2.99 ± 1.64	3.18 ± 2.11	3.51 ± 1.84	3.24 ± 2.14

Value are presented as the mean ± standard deviation. *p<0.05, compared to pre-intervention value.
CRet: capacitive and resistive electric transfer; VAS: visual analog scale; ICLT: thoracic component of the iliocostalis lumborum; ICLL: lumbar component of the iliocostalis lumborum; MF: lumbar multifidus.

Figure 1
Effects of capacitive and resistive electric transfer therapy on pain and lumbar muscle stiffness and activity in patients with chronic low back pain.
Michio Wachi et al

Scan this QR code and access the study



Combined with manual therapy, TECAR therapy offers better results for lower back pain.”

Aurore CHAMBAUDU
Physiotherapist and osteopath
France

The effectiveness of capacitive and resistive electric transfer therapy for non-specific chronic low back pain: a systematic review

Shumaila Ismail et al
DOI:10.5114/pq/189653

Summary

Introduction: TECAR therapy is widely used for the treatment of musculoskeletal disorders, including chronic non-specific low back pain (CNLBP). However, the effects of TECAR therapy on CNLBP have not yet been examined. The aim of this systematic review was therefore to evaluate the effectiveness of TECAR therapy in patients who had been suffering from CSLBS for 3 months

Methods:
Six electronic databases (PubMed, Embase, PEDro, MEDLINE, Scopus, and Cumulative Index to Nursing and Allied Health Literature) were systematically searched to identify relevant literature. The quality of the included studies was assessed using PEDro scores. In addition, a risk of bias analysis was performed using the Cochrane tool for assessing risk of bias.

Results:
Seven randomised controlled trials were included in this analysis, involving 351 participants aged 18 to 70. TECAR therapy was compared with manual therapy, other modalities, or placebo TECAR treatment (device turned off). Several devices, including Physio Radio Stim Pro, INDIBA Active Pro recovery HCR 902 and Winback, were used for TECAR therapy. These results indicate that TECAR therapy is an effective therapeutic option for immediate and long-term pain reduction and improvement in physical function in patients with CNLBP.

Conclusion

This review is the first attempt to collate and summarise the evidence on the efficacy of TECAR therapy for CNLBP. The results show that TECAR therapy is effective for the management of CNLBP. Future randomised controlled trials are expected to strengthen the evidence regarding the effectiveness of TECAR therapy in this context.

Scan this QR code and access the study

The effects of TECAR therapy on pain, range of motion, strength and subscale of HAGOS questionnaire in athletes with chronic adductor-related groin pain: a randomised controlled trial

Sara Nazari et al
DOI: 10.1186/s12891-025-08304-9

Summary

Introduction: Groin pain is a common problem among athletes. Pain related to the adductors is recognised as the most common cause of groin pain. Although non-surgical treatments have limited effectiveness, Capacitive and Resistive Energy Transfer (TECAR) can be used in the management of musculoskeletal conditions. The aim of this study is to explore the effect of TECAR therapy on pain, range of motion (ROM), muscle strength and the Copenhagen Thigh and Groin Assessment Scale (HAGOS) subscales in athletes suffering from adductor-related groin pain (ARGP).

Methods: This study was a randomised, placebo-controlled, parallel-group trial designed to demonstrate the superiority of the intervention. A total of 22 male professional athletes (mean age: 21.36 years) were randomly assigned to either a real TECAR group (n = 11) or a placebo TECAR group (n = 11), according to a balanced block randomisation. Both groups followed a stretching exercise programme. The intervention group received 10 TECAR sessions, while the control group received placebo TECAR. The primary endpoint was pain, measured using the Visual Analogue Scale (VAS). Secondary endpoints included ROM, strength and HAGOS questionnaire subscales. All criteria were assessed at inclusion, after 5 sessions, after 10 sessions and one month after treatment. ANOVA and ANCOVA were used to compare intergroup differences, with a significance threshold set at p = 0.05. The effect size (Cohen's d) was also reported. The study was conducted from September 2022 to August 2023 at the Rehabilitation Clinic of the Iran University of Medical Sciences.

Results: Twenty-two male athletes were included (11 per group), with a mean age of 21.09 years in the TECAR group and 21.63 years in the placebo group. TECAR therapy was associated with a significant reduction in pain intensity at all stages of assessment. After 5 sessions, a significant effect size was observed (p = 0.01, d = -1.09 [95% CI: -0.195 to -1.987]); after 10 sessions, the effect was even more pronounced (p = 0.001, d = -2.153 [95% CI: -1.103 to -3.203]); and at the 1-month follow-up, the reduction in pain persisted (p = 0.001, d = -1.96 [95% CI: -0.944 to -2.978]). With regard to secondary endpoints, a significant improvement in hip adduction range of motion was observed at the 1-month follow-up (p = 0.03, d = 0.908 [95% CI: 0.03 to 1.78]). However, no statistically significant differences were found for the other secondary endpoints, with effect sizes ranging from zero to intermediate.

Conclusion

The results of this study suggest that TECAR therapy can reduce pain and improve hip adduction range of motion in athletes with groin pain related to the adductors.

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Short-Term Effects of Manual Therapy plus Capacitive and Resistive Electric Transfer Therapy in Individuals with Chronic Non-Specific Low Back Pain: a Randomised Clinical Trial Study

Konstantinos Kasimis et al
DOI: 10.3390/medicina59071275

Summary

Protocol and methodology
Sixty patients with chronic non-specific low back pain (CNSLBP) were randomly divided into three groups:
- One group receiving manual therapy (MT) alone,
- A group receiving manual therapy combined with TECAR therapy (capacitive and resistive electrotherapy) with a bracelet,
- A control group (receiving no treatment).

Each patient received six sessions over a two-week period.
Pain intensity was assessed over a 24-hour period.

- Evaluation of the effectiveness of massage + mobilisation.
- Analysis of the maintenance of effects over time.
- Results consistent with those of Tashiro et al., who also observed a significant reduction in pain when incorporating TECAR therapy into a programme oftherapeutic exercises in patients with CNSLBP.
- These results encourage further research into protocols combining TECAR and exercises, with a view to improving patient care.
- A statistically significant difference was observed between the TM group and the TM + TECAR group, in favour of the latter.

Conclusion

The application of a protocol combining manual therapy and TECAR therapy proved to be more effective than manual therapy alone or no treatment. It resulted in a significant reduction in pain and disability, as well as an improvement in the pressure pain threshold (PPT) in patients with chronic non-specific low back pain.

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The Use of Capacitive and Resistive Energy Transfer in Postpartum Pain Management in Women after Perineal Trauma

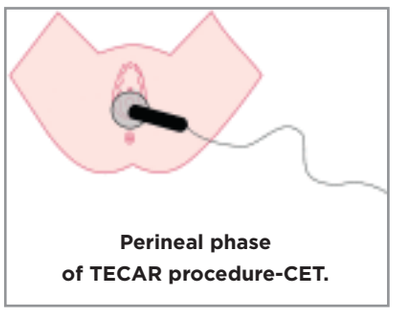
Joanna Sierenska et al
DOI: 10.3390/jcm12186077

Protocol
- Double blind
- 121 women of average age
- Control group device on standby
- Thermal adjustment to be set before the examination

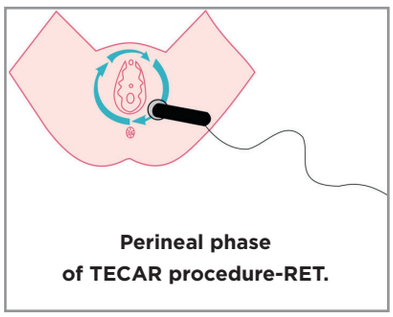
Observed effects
- Reduction in pain at rest and when walking
- Significantly greater reduction in discomfort when walking
in the TECAR group compared to the control group ($p < 0.05$).

Conclusion

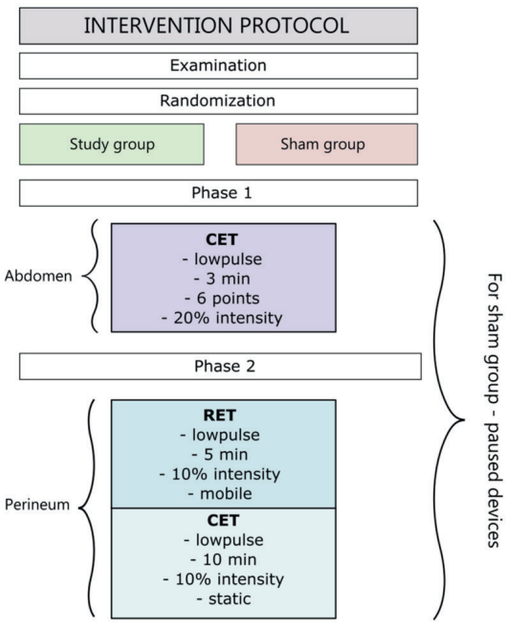
This study showed that the use of high-frequency current therapy can have a positive effect on reducing pain and discomfort in the first few days after vaginal delivery with perineal trauma.



Perineal phase of TECAR procedure-CET.



Perineal phase of TECAR procedure-RET.



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Capacitive-resistive radiofrequency therapy to treat postpartum perineal pain: A randomised study

Florence Bretelle et al
DOI: 10.1371/journal.pone.0231869

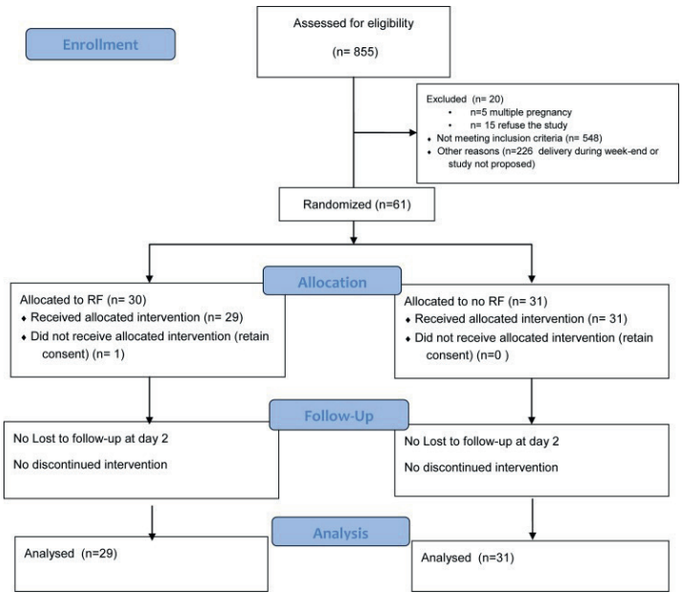
Protocol
- Double-blind
- Either perineal tears or an episiotomy after vaginal delivery (with or without instrumental assistance)
- Day 1 and Day 2 Postpartum

Results- The primary outcome was pain assessed at rest using a visual analogue scale on day 2. At rest, a VAS > 4 was observed in both the CT and EX groups.

- Secondary outcomes included:
- On day 2, discomfort and pain when walking and sitting, type of pain, and analgesic use.
- Resumption of sexual intercourse and pain during sexual intercourse were also assessed by telephone call 30 days after delivery.

Conclusion

EVA on day 2 was not different in the experimental group and the control group, but TECAR RF was associated with less perineal pain during walking and lower paracetamol consumption after delivery was reported in the TECAR group.



Scan this QR code and access the study

Postpartum care has been improved with the addition of high-frequency currents, resulting in reduced pain, discomfort and medication use.”

Dr Simona Simone
Physiotherapist and osteopath
Italy

Analgesic effects of medium-frequency currents

The effects of the Aussie current on pain, torque and muscle strength: Systematic review

Andressa Mourão de Andrade et al
DOI: 10.1016/j.jbmt.2024.04.023

Summary

Background: Aussie current (AC) is a medium-frequency (1 and 4 kHz) burst-modulated electrical current used to reduce pain, increase muscle strength and produce torque in adults. However, there is still no consensus regarding these effects.

Objectives: To conduct a systematic review of available data on the effects of AC current on pain, muscle strength, torque, comfort, and functionality in adults.

Methods: This systematic review was conducted according to PRISMA guidelines and registered in PROSPERO. A search was conducted in the Lilacs, Scielo, Web of Science, Scopus, PubMed and PEDro databases between October 2021 and February 2022. Randomised and non-randomised clinical trials that studied the effects of AC current application were included. Two assessors independently judged the risk of bias in the studies using the JADAD scale. The quality of evidence for certain outcomes was assessed using the GRADE system. The selected studies used AC as an intervention and had pain, muscle strength, torque, comfort and/or functionality as outcome measures.

Results: 21 studies (590 participants) were included. Fourteen articles were classified as low quality and seven as high quality. The overall quality of the evidence was rated as moderate. The effects of AC current on the criteria studied remain controversial. Regarding consensus on the frequency used, 80.9% (n = 17) of studies applied a frequency of 1 kHz.

Conclusion

Although the frequency of 1 kHz is the most commonly used, studies on AC current remain limited and vary in methodology, making it difficult to assess its effectiveness. Further research is therefore needed to better clarify the effects of AC on pain, muscle strength and torque production.

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Cellular effects

Anti-fibrotic effects of RF electric currents

María Luisa Hernández-Bule et al
DOI: 10.3390/ijms241310986

From a cellular point of view, studies conducted on human cells in culture, stimulated by a TECAR current, have revealed some rather interesting effects. These include increased fibroblast migration and proliferation, as well as a positive impact on cell remodelling and the extracellular matrix. Effects on pro-inflammatory factors, collagen synthesis and hyaluronic acid have also been observed, as well as promising results on granulation tissue.

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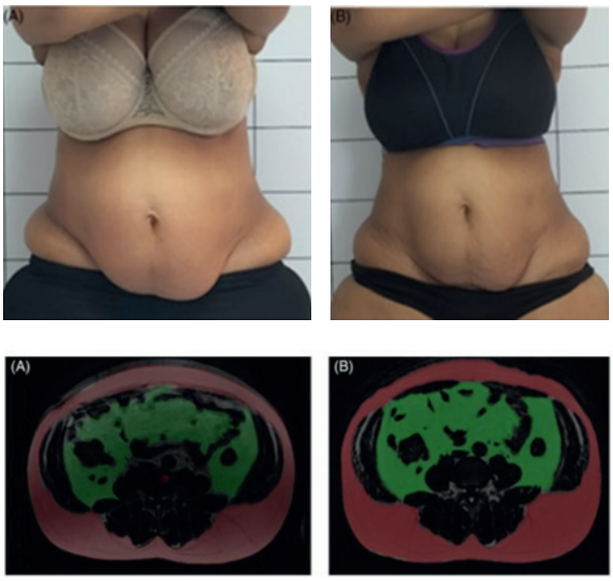
Aesthetic effects

In the field of non-invasive aesthetics, these observations could open up interesting prospects, both for the treatment of scars and for skin rejuvenation, by acting on skin ageing. The application of this technology could represent a significant advance in the management of skin scars, helping to prevent them from becoming chronic or developing abnormally.

Conclusion

To conclude on an aesthetic note, some studies show a reduction in waist circumference after using TECAR current, even at a frequency of 1 MHz. These effects are statistically significant, both on waist circumference and subcutaneous fat, as shown in the MRI images below, illustrating the reduction in fatty tissue.



Figures 1 and 2
Loss of subcutaneous fat in 20 patients, both sexes, using a second-generation TECAR device of 1,240 Watts and results analysed with magnetic resonance.
JR Lastra et al
DOI: 10.1111/jocd.16078

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In the field of aesthetics, TECAR therapy is proving to be an attractive alternative for patients who do not wish to undergo surgery.”

Effects on amplitude

Effects of deep thermotherapy on chest wall mobility in healthy elderly women

Tsubasa Bito et al
DOI: 10.1080/15368378.2020.1737803

This parameter has not yet been studied extensively, but the current findings appear promising. We have already mentioned Michio Wachi's (2022) work on pain, which also showed a positive effect of TECAR therapy on maximum trunk flexion in a population of patients with low back pain.

In the section on placebos, we mentioned a study on strokes, revealing a very interesting effect of therapy on knee and ankle range of motion after surgery. Tsubasa Bito's study is along the same lines, this time focusing on thoracic mobility.

Beyond the impact on amplitude, encouraging results have been observed in terms of reducing functional disabilities, as highlighted by Yuto Tashiro in 2020.

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In summary, current research on TECAR/RF frequency is very encouraging and suggests further advances that are likely to benefit a greater number of patients in the future.”

Placebo effects

Immediate Effects of TECAR Therapy on Gastrocnemius and Quadriceps Muscles with Spastic Hypertonia in Chronic Stroke Survivors: A Randomised Controlled Trial

Laura García-Rueda et al
DOI: 10.3390/biomedicines11112973

As with any technology or treatment, it is important to consider the potential bias associated with the placebo effect. To this end, there are several methods that can be used to reduce or eliminate this effect, such as using a machine that is turned off or simulating the effect of the machine, thus serving as a control group.

Several studies in the literature have explored this issue. It has been shown that the use of TECAR therapy can significantly improve range of motion and reduce muscle tone in stroke patients. In one of these studies, the simulation consisted of heating the electrode to mimic the effect of the therapy.

In this study of the stroke population, they found that:

The MAS score for dorsiflexion of the ankle showed statistically significant changes compared to the control group between T0 and T1 ($p = 0.046$) and between T0 and T2 ($p = 0.019$).

No statistically significant changes were observed for hip flexion mas or knee flexion mas.

The degrees of ankle dorsiflexion showed significant improvements for the intergroup analysis between T2 and T0 ($p = 0.011$).

In the inter-group analysis of the PROM for the gastrocnemius variable, statistically significant differences were demonstrated between T2 and T0 ($p = 0.034$). In the intra-group analysis, a significant improvement was observed in the experimental group between T1 and T0 ($p = 0.028$) and between T2 and T0 ($p = 0.033$).

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To better eliminate the placebo effect, some studies use a procedure known as "sham". This method allows the non-specific effect of the technique used to be taken into account. For example, a study conducted on horses that received TECAR therapy treatment, whileanother study on sport horses also revealed positive and significant effects on the animals' gait and trot. Another study on sport horses also revealed positive and significant effects on the animals' gait and trot in the group treated with CRET.

To continue this approach of eliminating the placebo effect, a study conducted on women examined the application of TECAR therapy current on thoracic flexibility, which tends to decrease with age. The results, illustrated below, show that the group receiving CRET achieved more significant effects than the group receiving a hot pack or sham treatment. Haruna Matsushita's 2022 study supports this finding, confirming the positive effect of TECAR therapy compared to the use of heat packs.

Table 2. The pre-post intervention difference within group.

	CRet (N = 10)		Hot pack (N = 9)		Sham (N = 8)	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Axillary excursion	1.81 ± 0.55(1.80)	2.31 ± 0.58(2.45)*	2.76 ± 0.87(2.80)	2.74 ± 0.82(2.70)	2.51 ± 1.51(1.85)	2.95 ± 1.86(2.00)[1]
Xiphoid excursion	2.63 ± 0.97(2.40)	3.19 ± 0.98(3.05)*	2.54 ± 1.31(2.50)	2.74 ± 1.17(2.50)	3.25 ± 1.85(3.1)	3.36 ± 2.01(3.15)
Tenth rib excursion	1.68 ± 0.93(1.65)	2.45 ± 0.70(2.40)*	2.07 ± 1.33(1.70)	2.76 ± 1.37(2.50)*	2.35 ± 0.87(2.15)	2.78 ± 1.00(2.45)
FVC (L)	2.37 ± 0.56(2.27)	2.38 ± 0.52(2.25)	2.37 ± 0.50(2.31)	2.37 ± 0.47(2.41)	2.55 ± 0.36(2.49)	2.47 ± 0.39(2.44)
FEV_1 (L)	1.85 ± 0.44(1.94)	1.84 ± 0.40(1.91)	1.87 ± 0.48(1.84)	1.84 ± 0.46(1.82)	1.96 ± 0.28(1.97)	1.96 ± 0.26(1.93)
ST (°C)	32.5 ± 0.83(32.3)	33.2 ± 0.93(33.4)	33.3 ± 1.02(33.1)	35.4 ± 0.46(35.4)*	32.3 ± 0.86(32.2)	31.5 ± 0.71(31.4)*
10 mm DT (°C)	34.0 ± 0.87(34.2)	36.8 ± 0.71(37.1)*	35.1 ± 0.95(35.5)	37.3 ± 0.29(37.3)*[a]	33.5 ± 1.06(33.7)	32.8 ± 0.90(32.8)
20 mm DT (°C)	34.0 ± 0.87(34.0)	37.6 ± 0.53(37.5)*[a]	34.9 ± 0.84(35.2)	37.4 ± 0.39(37.3)*	33.5 ± 1.07(33.5)	33.4 ± 0.97(33.1)

Mean ± SD (Median) *:$p < 0.05$ vs pre intervention values
[a]Wilcoxon signed-rank test was used; CRet: Capacitive and Resistive electric transfer; FVC: Forced vital capacity; FEV_1: Forced expiratory volume in one second; ST:Skin temperature; DT:Deep temperature.

Figure 1
Effects of deep thermotherapy on chest wall mobility of healthy elderly women.
Tsubasa Bito et al
DOI: 10.1080/15368378.2020.1737803

Scan this QR code and access the study

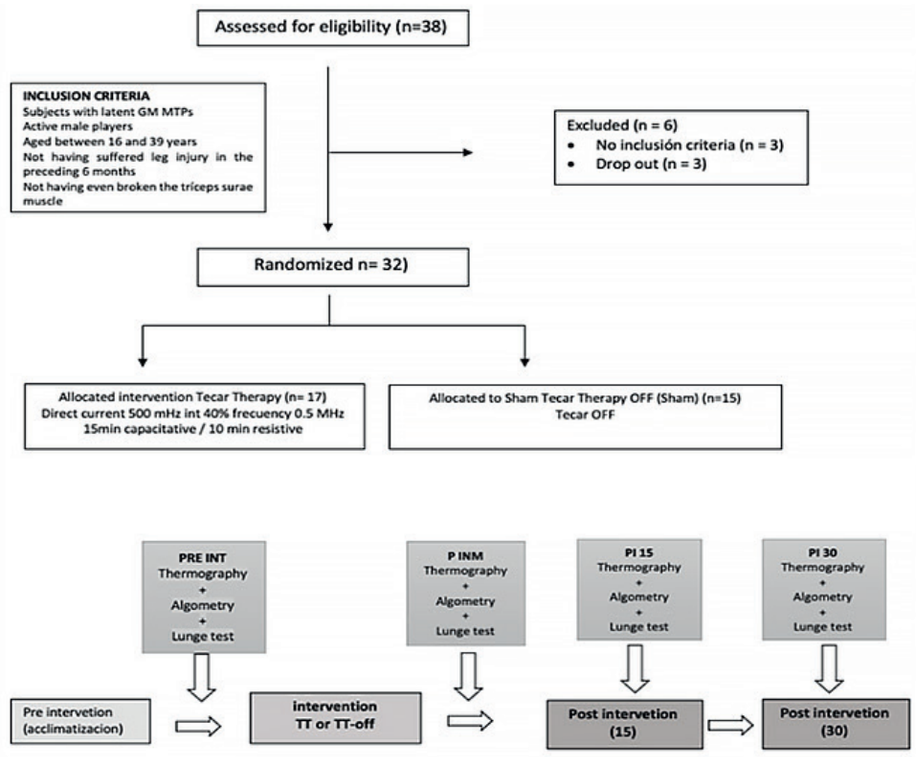
Acute Effects of TECAR Therapy on Skin Temperature, Ankle Mobility and Hyperalgesia in Myofascial Pain Syndrome in Professional Basketball Players: A Pilot Study

Mireia Yeste-Fabregat et al
DOI: 10.3390/ijerph18168756

This study examined the effect of TECAR on professional basketball players, comparing it to a placebo (machine turned off). Researchers analysed the impact of TECAR on pain, range of motion and thermotherapy. The results showed a significant reduction in myofascial pain, as well as an increase in skin temperature related to the treatment. However, no improvement was observed in range of motion.

It is important to qualify this last result: the population studied already had a good basic range of motion, which explains why the treatment did not result in significant changes in this parameter.

Please find attached the breakdown of patients.

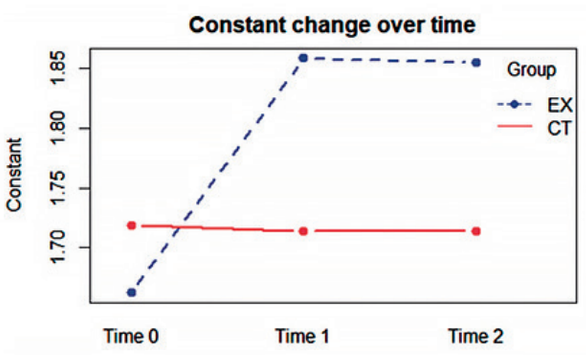


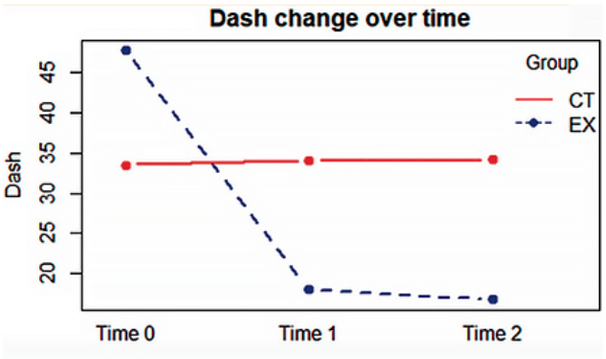
Scan this QR code and access the study

Effects of capacitive and resistive electric transfer therapy in patients with painful shoulder impingement syndrome: a comparative study

T Paolucci et al
DOI: 10.1177/0300060519883090

To continue this analysis of the placebo effect, Paolucci's 2020 study showed a significant effect on several parameters tested: the Constant score, the DASH score, and the EVA assessment. These results were observed in the context of shoulder impingement, comparing a machine turned off with a machine in automatic mode. The results, illustrated in the graph below, highlight the strength of this study, which shows interesting short-term effects.





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Does the Application of TECAR Therapy Affect Temperature and Perfusion of Skin and Muscle Microcirculation? A Pilot Feasibility Study on Healthy Subjects

Ron Clijsen et al
DOI: 10.1089/acm.2019.0165

To continue this summary of the results, it is interesting to note that, in Ron Clijsen's pilot study (2020), the application of TECAR therapy significantly influenced subcutaneous perfusion pilot study by Ron Clijsen (2020), the application of TECAR therapy significantly influenced subcutaneous perfusion and intramuscular blood flow. However, no influence on heart rate was observed. On the other hand, an effect on skin temperature was noted, particularly in the RET system.

Moreover, this increase in skin temperature was also confirmed in a study conducted by Valentini in 2021, performed in dogs.

Thus, we can conclude from these studies that there is definite interest in using TECAR therapy to induce a local muscular effect without impacting the rest of the body. This is, in a way, a phenomenon of natural homeostasis in the body.

Scan this QR code and access the study

Year of publication	Article title, Author, Country	Data Quality of Score	Conclusion
2025	Pain Decrement Using Radiofrequency Therapy After Knee Platelet-Rich Plasma Injections Within First 72 h in Active Populations with Patellar Chondropathy, Abat, Spain, Chile	6	TECAR therapy administered after knee intra-articular injections of PRP within the first 72 h in active populations with patellar chondropathy reduces pain sensation.
2025	The effects of TECAR therapy on pain, range of motion, strength and subscale of HAGOS questionnaire in athletes with chronic adductor related groin pain: a randomized controlled trial, Nazari, Iran	5	TECAR therapy may reduce pain and improve hip adduction range of motion in athletes with adductor-related groin pain.
2025	Locoregional and systemic effects of TECAR therapy on hypertension, Fatu, Romania	4	The vasodilation produced promotes tissue healing processes by stimulating biotrophy, analgesia, venolymphatic drainage, and muscle relaxation.
2025	TECAR Therapy: A Clinical Commentary on its Evolution, Application, and Future in Rehabilitation, Lupowitz, USA	4	Current evidence suggests that TECAR therapy may effectively reduce pain, improve range of motion, facilitate tissue regeneration, enhance biomechanical parameters and running economy, potentially leading to improved athletic performance.
2025	Evaluation of the efficacy of Capacitive Resistive Monopolar Radiofrequency at 448 kHz in the physiotherapeutic treatment of female dyspareunia, Abelló Pla, Spain	4	Manual therapy alone and in combination with TECAR therapy improved sexual function immediately after treatment.
2025	The effectiveness of capacitive and resistive electric transfer therapy for nonspecific chronic low back pain: a systematic review, Ismail, Japan	5	The findings reveal that TECAR therapy is effective for managing nonspecific chronic low back pain.
2025	Acute effects of medium-frequency electrical energy transfer (TECAR) and transcutaneous electrical nerve stimulation (TENS) on pain and flexibility in athletes with an acute hamstring injury: A randomized controlled trial, Kelli, Greece	1	In the acute phase of hamstring injury, the use of TECAR and, to a lesser extent, TENS may relieve pain symptoms and bring some improvements in flexibility more than instructing patients to rest.
2024	Comparison of the effect of separate and simultaneous application of Tecar therapy and low-level laser therapy on the neurological symptoms of type 2 diabetic patients with peripheral neuropathy of lower limbs, Javan Amoli, Iran	5	The use of combined TECAR therapy and laser could lead to a more lasting effect in improving the sensory symptoms of type 2 diabetic patients with peripheral neuropathy of the lower limbs.
2024	Effects of high-frequency hyperthermia on the elastic modulus of the lumbar muscle in female athletes with low back pain: A randomized crossover trial, Miyamori, Japan	6	TECAR therapy can be used to reduce the shear elastic modulus of the multifidus muscle in the short term.
2024	Changes in the Sprint, Vertical Jump and Quadriceps Strength after a Capacitive Resistive Electric Transfer Therapy Intervention—A Randomized Clinical Trial, Canet-Vintró, Spain	6	An improvement tendency was observed in sprint and quadriceps strength following TECAR therapy.
2024	Comparison of Tecar Therapy and Low-Level Laser Therapy Separately and Simultaneously on Clinical Symptoms and Health-Related Quality of Life in Individuals with Type 2 Diabetes: A 3-Month Follow-up Study, Amoli, Iran	3	The synergistic use of TECAR therapy and LLLT after a long-term follow up period could lead to more durable therapeutic effects in improving clinical symptoms and health-related quality of life for individuals with diabetes.
2024	Comparative Study Of Hot Pack Along With Therapeutic Ultrasound And Exercise Versus Therapeutic TECAR Along With Myofascial Release And Exercise On Supraspinatus Tendinitis In Female, Kumar, India	3	The combination of therapeutic TECAR and myofascial release with exercise proved to be effective for managing supraspinatus tendinitis in female patients.
2024	The Effects of Manual Therapy with TECAR Therapy, on Pain, Disability and Range of Motion in Women with Non-specific Chronic Neck Pain, Bameri, Iran	3	TECAR seems to be able to increase the effectiveness of manual treatments as a thermal modality.
2024	Aesthetic Rehabilitation Medicine: Enhancing Wellbeing beyond Functional Recovery, Lippi, Italy	5	This review emphasizes the role of a multidisciplinary approach (included TECAR therapy), aiming to provide valuable insights into potential benefits for both functional and aesthetic outcomes.
2024	Effects of monopolar pulsed-capacitive dielectric radiofrequency diathermy in patients with chronic low back pain: a randomised clinical trial, Lara-Palomo, Spain	6	The treatment of CLBP with a 9-session dose of pulsed-capacitive radiofrequency produced clinically significant improvements in pain, disability, and functionality in the short term.
2024	Evaluation of the efficacy of transfer energy capacitive and resistive therapy in patients with knee osteoarthritis, Tezen, Turkey	5	For the conservative treatment of OA in the knee, TECAR therapy may be a helpful therapeutic approach with a reduction of pain, improvement of disability and increase in quadriceos strength.

Year of publication	Article title, Author, Country	Data Quality of Score	Conclusion
2023	Effectiveness of 448-kHz Capacitive Resistive Monopolar Radiofrequency Therapy After Eccentric Exercise-Induced Muscle Damage to Restore Muscle Strength and Contractile Parameters, Šimunič, Slovenia	6	Beneficial effect of TECAR therapy after inducing EIMD in skeletal muscle strength and contractile parameters in knee flexors.
2024	Comparing the Effect of Capacitive and Capacitive-Resistive TECAR Therapy on Hamstring Muscle Flexibility in Individuals with Hamstring Shortness: A Randomized Controlled Trial, Mousavi, Iran	5	TECAR therapy was effective in improving hamstring flexibility compared to the sham treatment, demonstrating its clinical utility.
2024	Efficacy of capacitive and resistive electric transfer at muscle level. Literature review, Sánchez Lozano, Spain	4	TECAR therapy improves muscle strength, physical function, muscle pain, mobility, facilitates muscle activity and reduces disability.
2023	Physiotherapeutic effects of an innovative golf swing-assist device on discomfort and mobility in amateur golfers with low back pain: A randomized controlled trial, Park, Korea	6	TECAR therapy improves pain control and mobility in amateur golfers with low back pain.
2024	Capacitive and resistive electrical transfer method for athletes with non-specific low back pain, Avramova, Bulgaria	4	TECAR therapy demonstrates superior clinical outcomes in pain relief, mobility, and lumbar spine functionality, making it a valuable addition to specialized kinesitherapy programs for athletes with non-specific low back pain.
2024	Evaluating the Efficacy of Capacitive Resistive Monopolar Radiofrequency Combined With Proprioceptive Neuromuscular Facilitation in Managing Chronic Low Back Pain: A Randomised Controlled Trial, Jurak, Croatia	5	TECAR therapy with proprioceptive neuromuscular facilitation experienced improvements in pain and functional disability, surpassing the minimally clinically important difference (MCID) for the VAS, ODI, QPDS and RMDQ.
2023	Immediate Effects of TECAR Therapy on Gastrocnemius and Quadriceps Muscles with Spastic Hypertonia in Chronic Stroke Survivors: A Randomized Controlled Trial, García-Rueda, Spain	6	A single session of TECAR therapy at the same time with functional massage on the gastrocnemius and rectus femoris immediately reduces muscle tone and increases the passive range of motion of both ankle and knee in chronic stroke survivors.
2023	Impact of TECAR therapy on post-natal rectus diastasis: A randomized trial, Elhosary, Egypt	6	Using TECAR therapy with a standard program of abdominal exercises and low caloric diet has beneficial effects on postnatal diastasis recti abdominis.
2023	Comparison Between the Effects of Transfer Energy Capacitive and Resistive Therapy and Therapeutic Ultrasound on Hamstring Muscle Shortness in Male Athletes: A Single-Blind Randomized Controlled Trial, Choobsaz, Iran	5	TECAR therapy could increase the flexibility of hamstring muscles more than ultrasound therapy.
2023	The Use of Capacitive and Resistive Energy Transfer in Postpartum Pain Management in Women after Perineal Trauma, Sierеńska, Poland	4	TECAR has been shown to provide more immediate and significant reduction in perineal pain and discomfort than the sham treatment.
2023	Short-Term Effects of Manual Therapy plus Capacitive and Resistive Electric Transfer Therapy in Individuals with Chronic Non-Specific Low Back Pain: A Randomized Clinical Trial Study, Kasimis, Greece	5	The application of a manual therapy protocol with TECAR therapy appeared more effective than conventional manual therapy in reducing pain and disability and improving pressure pain threshold in individuals with CNSLBP.
2023	The effect of Tecar therapy on neurological disorders and nerve conduction velocity of lower limbs in peripheral neuropathy of type 2 diabetic patients: A six-week follow-up study, Niajalili, Japan	5	TECAR therapy could improve neuropathy symptoms and tibial nerve conduction velocity in diabetic individuals with peripheral neuropathy. The use of this method to control the symptoms of diabetic patients can be recommended.
2023	Effect of Adding Transfer Energy Capacitive and Resistive Therapy to Conventional Therapy for Patients With Myofascial Pain Syndrome in Upper Trapezius: A Randomized Clinical Trial, Taheri, Iran	4	A combination of TECAR therapy, exercise, and medication substantially reduced symptom severity for patients with myofascial pain syndrome in the upper trapezius when compared to only exercise and medication.
2023	The Efficacy of Electromagnetic Diathermy for the Treatment of Musculoskeletal Disorders: A Systematic Review with Meta-Analysis, Pollet, International	5	The results did not support the adoption of diathermy in a clinical context, preferring therapies supported by evidence.
2022	Effects of Capacitive-Resistive Electric Transfer on Sports Performance in Paralympic Swimmers: A Stopped Randomized Clinical Trial, De Sousa-De Sousa, Spain	4	The proposed protocol and level of hyperthermia applied suggest refusal of TECAR therapy use for the 100-m distance a few minutes before sports practice. The analysis suggests the need to modify the presented protocol.

Year of publication	Article title, Author, Country	Data Quality of Score	Conclusion
2022	Efficacy of capacitive resistive monopolar radiofrequency in the physiotherapeutic treatment of chronic pelvic pain syndrome: A randomized controlled trial, Carralero-Martínez, Spain	5	TECAR therapy demonstrates its superiority compared to a sham treatment in decreasing pain and improving QoL.
2022	Mid- and Long-Term Results Using 448 kHz Stimulation on the Elasticity of the Supraspinatus Tendon Measured by Quantitative Ultrasound Elastography in Badminton Professionals: Prospective Randomized Double-Blinded Clinical Trial with Nine Months of Follow-Up, Navarro-Ledesma, Spain	6	A three-week intervention program using TECAR therapy produced significant changes in the elasticity of the supraspinatus tendon, with the changes lasting up to approximately three months when compared to the control group.
2022	The Effect of Capacitive and Resistive Electric Transfer Intervention on Delayed-Onset Muscle Soreness Induced by Eccentric Exercise, Nakamura, Japan	6	Knee flexion ROM, muscle strength (MVC-ISO and MVC-CON), and muscle soreness significantly improved after TECAR therapy. TECAR therapy may improve muscle soreness and loss of muscle function in an eccentrically damaged muscle.
2022	TECAR Therapy Associated with HILT and Manual Therapy in the Treatment of Muscle Disorders: A Literature Review on the Theorised Effects Supporting Their Use, Szabo, Romania	4	TECAR therapy, combined with manual therapy and High-Intensity Laser therapy in treating muscle diseases, presented optimal collaboration in the recovery process of all muscle diseases.
2022	Effects of Transfer Energy Capacitive and Resistive On Musculoskeletal Pain: A Systematic Review and Meta-Analysis, Vahdatpour, Iran	5	The findings may assist clinicians in decision-making about TECAR therapy for the approach to musculoskeletal pain based on evidence-based medicine.
2022	Comparison of the Radial Extracorporeal Shock Wave Therapy (rESWT) and Transfer Energy Capacitive and Resistive (TECAR) Therapy on Pain, Range of Motion, Function in Patients with Adhesive Capsulitis: A Systematic Review and Meta-Analysis of RCTs, Hameedi, Iran, Turkey, Iraq	5	TECAR therapy and rESWT were effective in term of pain intensity, shoulder function and joint range of motion.
2022	Effects of the Winback Therapy on Pain and Physiological Characteristics of the Trapezius in Patients with Work-Related Musculoskeletal Disorders, Yoon, Republic of Korea	6	TECAR therapy was effective in reducing muscle tone, muscle stiffness, and pain of trapezius in work-related musculoskeletal disorders.
2023	Effect of monopolar capacitive resistive radiofrequency in treating stress urinary incontinence: A pilot randomized control trial, Elhosary, Egypt	3	TECAR therapy and pelvic floor exercises are more effective methods for the treatment of stress urinary incontinence than just pelvic floor exercises.
2022	Effects of Non-Invasive Radiofrequency Diathermy in Pelvic Floor Disorders: A Systematic Review, González-Gutiérrez, Spain	5	Studies showed improvements in urinary incontinence, pelvic pain conditions, pelvic floor muscles strength and sexual function.
2022	Effects of capacitive and resistive electric transfer therapy on pain and lumbar muscle stiffness and activity in patients with chronic low back pain, Wachi, Japan	4	Significant therapeutic benefit of TECAR therapy in patients with chronic low back pain and muscle stiffness.
2021	Effects of Capacitive and Resistive Electronic Transfer Therapy in Musculoskeletal Diseases - A Results Overview of Recent Clinical Trials, Mitrić, Serbia, Bosnia and Herzegovina	5	TECAR therapy, applied either solely or in combination with conventional physiotherapies, have rapid and immediate effect, both in chronic and acute conditions.
2021	Application of Capacitive-Resistive Electric Transfer in Physiotherapeutic Clinical Practice and Sports, De Sousa-De Sousa, Spain	5	Identified fields of applications for TECAR therapy were musculoskeletal physiotherapy, treatment of pelvic floor and sexual dysfunctions, as well as dermato-functional physiotherapy and sports, evidencing an increase of skin temperature, enhanced skin and muscle blood perfusion, as well as reporting an increase in oxyhaemoglobin.
2021	Short-term effects of 448 kilohertz radiofrequency stimulation on supraspinatus tendon elasticity measured by quantitative ultrasound elastography in professional badminton players: a double-blinded randomized clinical trial, Navarro-Ledesma, Spain	6	TECAR therapy produces significant changes in supraspinatus tendon elasticity after an intervention program of three weeks and those changes last for a week when compared to control group.
2021	Comparison of the Effect of TECAR Therapy and Static Stretching on Hamstring Flexibility in Male Athletes, Mohamadi, Iran	2	TECAR therapy with static stretching causes a greater increase in hamstring flexibility than static stretching alone.
2021	Care for perineal tears in vaginal delivery: An update for midwife, Hartinah, Indonesia	4	Sutures and technique/suturing second degree perineal tears or a postpartum episiotomy can affect perineal pain.

Year of publication	Article title, Author, Country	Data Quality of Score	Conclusion
2021	Thermophysiological responses to capacitive resistive monopolar radiofrequency electromagnetic radiation in patients with osteoarthritis of the knee joint: A randomised controlled experimental study, Kumaran, UK	3	TECAR therapy delivered to participants affected by OA knee yielded highly significant gains in skin temperature, skin blood flow, deep blood flow volume and intensity of flow over the placebo and control interventions.
2021	Evaluation of the Effects of Tecar Therapy on Acute Symptoms of Athletes Following Lateral Ankle Ligament Sprain, Davari, Iran	2	TECAR therapy in patients with lateral ligament sprain of the ankle joint improves the condition of symptoms after an injury, including swelling, pain, daily life activities, percentage of athlete satisfaction with daily activities, and finally his performance.
2021	Acute Effects of Tecar Therapy on Skin Temperature, Ankle Mobility and Hyperalgesia in Myofascial Pain Syndrome in Professional Basketball Players: A Pilot Study, Yeste-Fabregat, Spain	4	TECAR therapy can induce changes in the absolute temperature of the medial gastrocnemius muscle.
2020	Capacitive and resistive electric transfer therapy in rehabilitation: a systematic review, Beltrame, Italy, Slovak Republic (multi-country, Europe)	4	TECAR therapy seems to be an effective therapy to decrease pain, and improve the quality of life and disability of patients affected by musculoskeletal disorders.
2020	Capacitive-resistive radiofrequency therapy to treat postpartum perineal pain: A randomized study, Bretelle, France	4	TECAR therapy was associated with less perineal discomfort while walking and lower consumption of paracetamol after delivery.
2020	The Effectiveness of Thermal Mode of 448 KHz Capacitive Resistive Monopolar Radiofrequency in Continuous Wave in Patients with Chronic Rotator Cuff Tendinopathy: A Clinical Trial, Stasinopoulos, Cyprus	4	TECAR therapy and exercise program reduced the pain and improved function and strength in patients with chronic rotator cuff tendinopathy at the end of the treatment and at the follow-ups.
2020	Effects of deep thermotherapy on chest wall mobility of healthy elderly women, Bito, Japan	5	TECAR therapy improved chest wall mobility at all levels while hot pack improved at the tenth rib level. TECAR therapy can be one of the approaches to improve chest wall mobility.
2019	Does the Application of Tecar Therapy Affect Temperature and Perfusion of Skin and Muscle Microcirculation? A Pilot Feasibility Study on Healthy Subjects, Clijsen, Switzerland	4	TECAR therapy showed improvement in the perfusion of the skin microcirculation and intramuscular blood flow compared to sham treatment.
2019	Effects of capacitive and resistive electric transfer therapy in patients with painful shoulder impingement syndrome: a comparative study, Paolucci, Italy	2	TECAR therapy could be a useful therapeutic option for the conservative management of shoulder pain to restore pain-free and powerful movement to the shoulder joint.
2019	Effect of an aerobic exercise session combined with abdominal radiofrequency on lipolytic activity in women: Randomized control trial, Noites, Portugal	5	The association of exercise with TECAR therapy did not present an increased effect on lipolytic activity when compared to the isolated exercise.
2019	Analgesic effects of a capacitive-resistive monopolar radiofrequency in patients with myofascial chronic neck pain: a pilot randomized controlled trial, Alguacil-Diego, Spain	6	TECAR therapy could have a potential effect on pain intensity.
2019	A Randomized, Split-Face, Evaluator-Blind Clinical Trial Comparing Monopolar Radiofrequency Versus Microfocused Ultrasound With Visualization for Lifting and Tightening of the Face and Upper Neck, Alhaddad, USA	4	Both TECAR therapy and microfocused ultrasound with visualization led to significant improvement in face and neck laxity.
2019	Treatment using 448 kHz capacitive resistive monopolar radiofrequency improves pain and function in patients with osteoarthritis of the knee joint: a randomised controlled trial, Kumaran, UK	4	TECAR therapy can improve pain and function in patients with knee osteoarthritis in the short term.
2019	Effect of four sessions of aerobic exercise with abdominal radiofrequency in adipose tissue in healthy women: Randomized control trial, Vale, Portugal	3	Combined exercise intervention with radiofrequency has been shown to be effective in reducing abdominal adiposity.
2018	Effects of a capacitive-resistive electric transfer therapy on physiological and biomechanical parameters in recreational runners: A randomized controlled crossover trial, Duñabeitia, Spain	3	TECAR therapy intervention enhances biomechanical parameters in recreational runners after an exhaustive training session more than passive rest, generating a more efficient running pattern without affecting selected physiological parameters.

Year of publication	Article title, Author, Country	Data Quality of Score	Conclusion
2018	A physiological and biomechanical comparison of over-ground and treadmill during asynchronous wheelchair propulsion, Astier, France. A remplacer par : The role of tecar therapy in the delayed onset muscle soreness and functional recovery, Guimaraes, Portugal	6	TECAR Therapy was shown to be effective in the relief of muscle soreness, from 24 hours after its application. Likewise, individuals treated with TECAR therapy had better recovery of muscle strength and function at the end of the 72 hours protocol.
2018	Effects of capacitive and resistive electric transfer therapy in patients with knee osteoarthritis: a randomized controlled trial, Coccetta, Italy	6	TECAR therapy might be a useful therapeutic option for the conservative management of KOA to reduce pain, stiffness and functional limitation.
2018	The Effectiveness of Tecar Therapy in Musculoskeletal Disorders, Ribeiro, Portugal	4	TECAR therapy is an excellent therapy for the physiotherapeutic use and it´s incorporation in a conventional rehabilitation program, or it´s isolated use, may have advantages in the short and long term effects.
2018	Effect of Capacitive and Resistive electric transfer on changes in muscle flexibility and lumbopelvic alignment after fatiguing exercise, Yokota, Japan	3	TECAR therapy could effectively improve muscle flexibility and lumbopelvic alignment after fatiguing exercise.
2018	Skin thermophysiological effects of 448 kHz capacitive resistive monopolar radiofrequency in healthy adults: A randomised crossover study and comparison with pulsed shortwave therapy, Kumaran, UK	6	TECAR therapy physiological responses were significantly more pronounced than that of pulsed shortwave therapy.
2019	Preliminary Evidence Of Effectiveness Of Tecar In Lymphedema, Cau, Italy	4	TECAR therapy can provide a relatively early reduction of lower limb edema with improvement of patients' function and pain.
2017	Continuous-mode 448 kHz capacitive resistive monopolar radiofrequency induces greater deep blood flow changes compared to pulsed mode shortwave: a crossover study in healthy adults, Kumaran, UK	3	Deep blood flow changes withTECAR therapy were more pronounced than that with pulsed shortwave therapy, placebo or control.
2017	Short Term Efficacy Of Capacitive-Resistive Diathermy Therapy In Patients With Low Back Pain: A Prospective Randomized Controlled Trial, Notarnicola, Italy	6	TECAR therapy determined significant improvement in the management of low back pain compared to laser therapy.
2017	Efficacy of Diathermy in Patients with Low Back and Pelvic Pain Referred to Lower Limb: A Pilot Study, Rodríguez Sanz, Spain	5	Physical effects of diathermy due to this technique is frequently associated with a kinesiotherapy program to get better results in patients with prevalent illness as lumbar and pelvic pain referred to lower limb.
2017	Does Transfer Capacitive Resistive Energy Has a Therapeutic Effect on Peyronie's Disease? Randomized, Single-Blind, Sham-Controlled Study on 96 Patients: Fast Pain Relief, Pavone, Italy	4	TECAR therapy has a positive short-term clinical effect on pain in patients with Peyronie's disease. The feasibility and tolerability of this treatment produce an attractive new therapeutic option for men with PD.
2017	Effects of High-frequency Diathermy Integrated into Suboccipital Release on Tenderness and Neck Mobility and Disability in People with Chronic Tension-type Headache, Lee, Korea	2	The suboccipital release technique may be advantageous to improve headache, tenderness, and neck function and mobility, with more favorable effects with the incorporation of TECAR therapy.
2016	Comparison among different therapeutic techniques to treat low back pain: a monitored randomized study, Morelli, Italy	3	TECAR therapy leads to an improvement of symptomatology of low back pain.
2015	Thermal build-up, decay and retention responses to local therapeutic application of 448 kHz capacitive resistive monopolar radiofrequency: A prospective randomised crossover study in healthy adults, Kumaran, UK	3	TECAR therapy can significantly increase and sustain skin temperature.
2014	The efficacy of capacitive radio-frequency diathermy in reducing buttock and posterior thigh cellulite measured through the cellulite severity scale, de la Casa Almeida, Spain	4	TECAR therapy is effective in reducing buttock and posterior thigh cellulite.
2012	Treatment for insertional Achilles tendinopathy: a systematic review, Wiegerinck, Netherlands	5	TECAR was effective for the decrease in pain intensity.

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