

# **The effectiveness of Capacitive Resistive Diathermy (Tecartherapy®) in acute and chronic musculoskeletal lesions and pathologies**

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**Abstract. Objectives:** To assess the clinical effectiveness of capacitive resistive diathermy (Tecartherapy®) in treatment of musculoskeletal lesions and pathologies based on clinical researches. **Data Sources:** Major medical databases, including Pubmed, Medline, Science Direct and Google Scholar. **Study selection:** Articles that contained data on the treatment of acute and chronic pathologies in sports with TecarTherapy®. **Data Synthesis:** Seven articles studied the effectiveness of Tecartherapy® apparatus in athletes presenting acute and chronic pathologies of the musculoskeletal. **Conclusion:** We concluded that Capacitive resistive Diathermy Tecartherapy® is able to treat knee, shoulder, hip, ankle, spinal column, hand, muscle injuries rapidly ,and efficiently, in addition to painful inflammatory, osteoarticular and muscular disorders (arthrosis, lumbago, sciatica).

**Key Words:** Tecartherapy®, Pathologies, Acute and Chronic musculoskeletal injuries.

## **Introduction**

Musculoskeletal injuries affect various structures of the musculoskeletal system including bones, muscles, ligaments, tendons, and nerves. It can be acute or chronic. Musculoskeletal pain can be limited in one area, or diffuse involving different areas. The most common type of musculoskeletal pain Lower is back pain. Other common types include tendonitis, tenosynovitis, myalgias , and stress fractures. [1,2,3](#)

Diathermy is a deep heat production production in body tissues using for therapeutic purposes by high-frequency currents. Diathermy is used in treating chronic musculoskeletal conditions. <sup>2,3,4</sup>

Diathermy is a physical therapy modality using for products moderate heat directly to pathological lesions in the deeper tissues of the body. moderate heat that can be produced by diathermy may be used to destroy neoplasm, warts and infected tissues, and to prevent blood vessels excessive bleeding. There are three diathermy agents: ultrasound, shortwave diathermy, and microwave diathermy.<sup>2</sup>

Recently, a system for capacitive and resistive energy transfer known as Tecartherapy® has been developed ,Capacitive and Resistive Diathermy (Tecartherapy®) promotes the natural physiological processes of tissue metabolism by transferring energy without introducing radiant energy from the exterior. Tecartherapy®, which uses the physical principle of the condenser, consists of a device composed of 2 facing and separated elements by an insulating material, these elements are connected to a current generator (machine body) that produces a potential difference between the 2 plates When we apply tension on the active electrode we produce an electrolytic movement in the tissue. <sup>3,5,6</sup>

Tecartherapy® can work in two modes of transfer of electric charges: capacitive and resistive mode. <sup>3,5</sup>

1. Capacitive Electrode :Reactions produced by the capacitive system are concentrated in tissues with higher electrolytic content (muscles and soft tissues) <sup>3,5</sup>

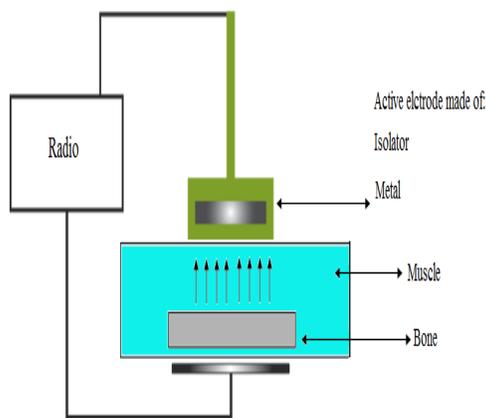


Figure 1: Capacitive Electrode

## 2. Resistive Electrode

Reactions produced by resistive system are concentrated in higher resistance tissues (bones/tendons/joints) <sup>3,5</sup>

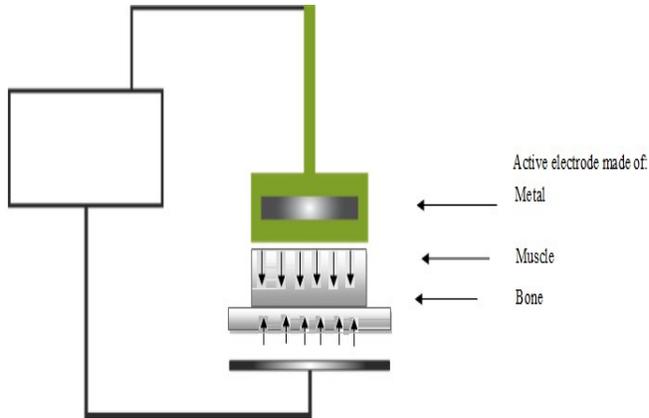


Figure 2: Resistive Electrode

Effects of Capacitive and Resistive Diathermy (Tecartherapy®): <sup>3,5</sup>

- Increase in the microcirculation.
- Vasodilatation (Oxygenation).
- Increase in internal temperature.

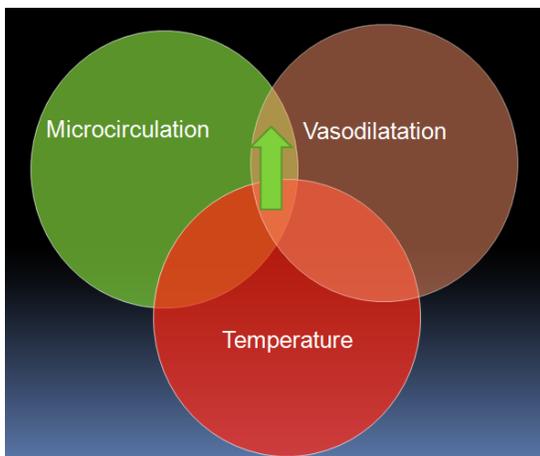


Figure 3: Effects of capacitive and Resistive Diathermy

The purpose of this research is to assess the clinical effectiveness of capacitive resistive diathermy (Tecartherapy®) in treatment of musculoskeletal lesions and pathologies based on clinical researches.

## **Methods**

To locate studies for inclusion in this literature research the electronic bibliographic databases Pubmed, Medline, Science Direct and Google Scholar searches were conducted using the following key words: “Tecar Therapy”, “HCR 90” [Major topic], “Acute pathologies”, “Chronic pathologies”, “Sports Pathologies”, “Musculotendinous injuries”, “Musculotendinous trauma”, “Tendinous pathologies”, Treatment, effectiveness, efficacy.

Studies were included in this research contained data on the treatment of acute and chronic pathologies in sports with TecarTherapy®. In other words, only articles that studied the effectiveness of Tecartherapy® apparatus in athletes presenting acute and chronic pathologies of the musculoskeletal were included in this project. In addition to that, the search was limited to articles written in English between 2009 and 2012. All papers that did not meet these criteria were excluded. These procedures yielded 7 studies that met the criteria for inclusion.

## **Results**

The first study which have been held by C. Tranquilli was measuring the effects of Tecartherapy® in pain monitored by Visual Analog Scale (VAS) and the effect in motor recovery time, It was conducted on 116 patients, the results showed that there was a significant decrease in pain before and after the application of the treatment in both acute and chronic cases, In addition to the pain decrease, Tecartherapy® showed a good benefits in decrease the motor recovery time. <sup>4</sup>

G.P. Ganzit in his study observed 327 subjects (120 females, 207 males) between 18 and 60 years of age with acute and chronic sports pathologies, they were treated with Tecartherapy®, the majority of the patients expressed a reduction in pain and improvement in function at the end of treatment. <sup>5</sup>

P. Mondardini study was conducted on 30 patients showed that the recovery time is fast when he used Tecartherapy®. <sup>6</sup>

The same results were obtained with E. Parolo when he applied capacitive resistive diathermy system (Tecartherapy®), he found that The majority of the subjects reported an improvement of pain symptoms in addition to a return to normal daily activities. <sup>7</sup>

A. Molina selected a total of 23 patients, and he discovered that a substantial improvement was achieved in 65% of the patients treated with capacitive resistive diathermy Energy Transfer. <sup>8</sup>

Maria Perez Benitez divided her study depending on patient's medical diagnosis but in general her patient's had an osteoarticular pathologies and she found that capacitive and resistive energy transfer technique is a very useful tool in the majority of osteoarticular pathologies, and its effectiveness increases if combined with other therapies. <sup>9</sup>

G. Melegati treated 15 players with ankle sprain, his study showed a high effect of Tecartherapy® in the control of effusion following sprain, and decrease of pain. <sup>10</sup>

## **Discussion**

This review assessed the clinical effectiveness of capacitive resistive diathermy (Tecartherapy®) in treatment of musculoskeletal lesions and pathologies based on clinical researches.

Use of Tecartherapy® for treating acute and chronic musculoskeletal lesions has yet to be documented in the rehabilitation literature, with the notable exception of the possibility of resolving pain rapidly, reducing odema and decreasing the recovery time.

Use of Tecartherapy® has been reported limited in the research literature in a limited variety of clinical populations, yet these measures have not been universally endorsed and remain limited to their particular geographic regions. For example, Tecartherapy® has enjoyed widespread adoption in Italy for varied clinical populations, but there is no evidence of it's use in other countries. On the

contrary, all the studies have used the same treatment device (Tecartherapy®) with some differences in the way and time of application, some of them have applied the device once a day/5 times a week, the others more than one time a day, but in common they have the same injuries in acute and chronic stages. <sup>4,5,6,7</sup>

One important finding is that the pain relief as the majority of the patients expressed a reduction in pain at the end of the treatment, the subjects were monitored by an independent observer using VAS from 0-10 degree. This scale was applied for all patients before and after treatment, subjects were divided according to the stage of injuries/pathologies in acute and chronic stage, the VAS monitoring showed that the pain severity decreased for both types of injuries/pathologies. To increase the accuracy of effectiveness of the device in pain management, one of the studies measuring the pain at rest, pain upon pressure and movements in acute and chronic stages, there was about 4 degrees of decrease in VAS. <sup>6,8</sup>

Pain evaluation using VAS from 1 to 10 is the best and easiest way to determine the severity of pain. The procedures which were held in the studies showed a good results because they used not just the VAS in general, they made a number of categories like the pain at rest, upon pressure and movement and this way may be more accurate to determine the effectiveness of Tecartherapy® in pain management or pain release because if they used just (VAS) in general without considering patients activity the result will show just the effect of the machine at rest. <sup>4,6,7,8</sup>

The second important finding that Tecartherapy® has the ability to increase the healing process or in other word decreasing the recovery time , the studies showed that in acute and chronic cases the recovery time decreased , but patients in chronic stage needed more time of treatment compared to those in acute stage. The way that they used for assessment of the result was using of muscle ultrasound before and after the treatment by measuring the diameter of the lesions ,but others used patients return to the activity without trauma and pain. <sup>7,8</sup>

An important point that should be emphasized is the treatment process in acute stage for all the patients that should begin after 72 hours of trauma because it is contraindicated to use diathermy in the acute period of trauma because of inflammation. <sup>3,4</sup>

In regard to the Tecartherapy® protocol which was used by all the studies, given the early application (third day following injury) in acute stage, we think that the protocol which is applied in this way by using this kind of machines increases the safety for patients and makes a good effect for such kinds of injuries/pathologies , because in our experience when we apply any kind of diathermy machines one of the important points that we have to consider is the inflammation which happen in the first period of trauma , this inflammation will increase if we apply any kind of diathermy machine. 4,5,6

Another important point that the effect of Tecartherapy® device in traumatic injuries is very benefit by increasing the healing process , the device increases the temperature of the tissue and this make an increasing in blood flow to the area of injury which help in increasing the recovery time. 4,5,8

A third finding is the effect of Tecartherapy® in releasing edema by increasing the temperature of the tissue, The blood flow increases and reduces the fluids from the traumatic point by applying the device around it .The edema observed by ultrasound examination reabsorbed after 4-5 days after treatment. 6,8

The point that we have to mention here is the important role of this device to decrease the edema depending on the researches findings and the theoretical effect of Tecartherapy® in body tissues, because of the effect of edema in the range of motion, but the problem that met all of the studies researchers is the time of application which done after 3 days in acute stages, maybe we can use another kind of treatment in the first 72 hours to deal with edema for example we can use ice massage or lympho-drainage to decrease it in the first 3 days before treatment. 4

The last problem that met our sample of researches in some of cases is the need of some exclusions for the treatment process, for example one case treatment procedure stopped after 2 days because of increasing edema but after 4 days they continued the same procedures with good results. The other problem is there were Only 2 patients still presented functional limitation of the scapulohumeral area, likely due to a chronic degenerative lesion of the cuff , but reported an overall improvement in pain symptoms .This mean that the early intervention by using Tecartherapy® has the best effect in musculoskeletal lesions/pathologies. 8

Finally in our opinion the using of Tecartherapy® in treatment of such kind of pathologies is effective and give us a good results in a short period of time, with high safety for the patients, and compared with other diathermy modalities it has less contraindications and it is used with less frequency.

## **Conclusions**

From these data we could also assume an effective action by the application of Capacitive Resistive Diathermy (Tecartherapy®) in the reduction of recovery time during sequences of repeated muscle exercises.

The capacitive and resistive energy transfer technique (Tecartherapy®) is useful in pain management and in increasing of the healing process and its effectiveness increases if combined with other therapies. Capacitive resistive diathermy Tecartherapy® is easy to use with no evidence of contraindication in the case of bone fractures.

Finally we concluded that Capacitive resistive Diathermy Tecartherapy® is able to treat knee, shoulder, hip, ankle, spinal column, and hand and muscle injuries rapidly and efficiently, in addition to painful inflammatory, osteoarticular and muscular disorders (arthrosis, lumbago, sciatica).The beneficial effects of Tecartherapy® are immediately evident : it's sufficient, in fact, to undergo a single sitting to witness its therapeutic effectiveness.

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