

Advances in the Treatment of Soft Tissue Injuries: PEMF and Multi Polar Radio Frequency

Soft tissue injuries are among the most common reasons people seek care from sports medicine and rehabilitation specialists. The professional's goal is to relieve pain, help the patient regain full movement, and strengthen the weakened area to prevent re-injury.

Achieving these outcomes can be challenging, and many people have misconceptions about soft tissue injuries (STIs) and the healing process, leading to frustration among patients when recovery does not go as anticipated or pain becomes chronic. This is especially true for competitive athletes.

In this report, we cover some of the common points of injury and treatment advances in STIs. Innovation is making more effective and efficient therapy possible. With proper education and the latest breakthroughs, the potential for patients to recover fully, enjoy their previous quality of life, and regain their level of performance has markedly improved. Among the newest modalities is multi-polar radio frequency (RF) combined with pulsed electro magnetic fields (PEMF), and we will introduce this synergistic approach, which is opening a new avenue of treatment.

What Are Soft Tissue Injuries?

But first, let's recap the basics. Soft tissue injuries include damage to muscles, ligaments and tendons. They can result from direct or indirect trauma. Direct trauma includes impact or abrupt overloading while indirect trauma is tied to repeated sub-maximum loading as with overuse injuries.¹ Some symptoms include pain, swelling, and restricted movement. Common injury types include:

- Contusions (bruises) result from blunt trauma such as a fall or blow. Symptoms typically include swelling, pain, and bleeding in the tissue that causes discoloration—the classic black and blue marks.²
- Sprains occur when ligaments—the bands of connective tissue connecting bones or joints—or stretch and often result from twisting force. Common sites for sprains are wrists, ankles and knees. Symptoms include pain, swelling, bruising and limited mobility in the affected joint.³

¹ "Soft Tissue Damage and Healing: Theory and Techniques" *International Association of Athletics Federation*. IAAF Medical Manual, n.d. Web. 28 Nov. 2012. Retrieved from www.iaaf.org.

² "Sprains, Strains and Other Soft tissue Injuries," *American Academy of Orthopaedic Surgeons*, OrthoInfo, Retrieved from <https://orthoinfo.aaos.org/en/diseases--conditions/sprains-strains-and-other-soft-tissue-injuries/>

³ Ibid

- Tendonitis is inflammation of the tendons, the connective tissue between muscle and bones. This injury often results from overuse and commonly occurs in the elbow, hand, wrist, hip, and shoulder. Symptoms can include tenderness, cramping, and weakness.⁴
- Strains happen when muscles or tendons stretch and tear. Strains of the lower back and hamstrings are among the most common presentations.⁵

Presentation and Treatment of Soft Tissue Injuries

Injury presents in three phases: acute, subacute/overuse, and acute chronic. The acute stage (macro trauma) is caused by sudden overload while subacute/overuse (micro trauma) stems from excessive, accumulated loading. The final stage has both cumulative loading and rapid overloading.⁶

When the body adapts to the tissue overload, symptoms resolve on their own. Other injury pathways include repair mostly via fibrosis which may lead to a degenerative response. Healing spans three phases: the acute inflammatory stage lasting up to 72 hours, the repair stage lasting from 48 hours to six weeks, and the remodeling phase from three weeks to a year or more.⁷

The classic treatment protocol in the first three days after a soft tissue injury is R.I.C.E (rest, ice, compression, elevation) while avoiding HARM factors (heat, alcohol, running/exercise, and massage). Such treatments primarily provide symptom relief without addressing the underlying problems.⁸

Further treatment often focuses on thermal or mechanical therapy. Energy-based devices including ultrasound, TENS, cold laser, and other modalities are used to address tissue pain, stiffness, and weakness. Therapies such as Active Release, Graston Technique, massage, and musculoskeletal manipulation/chiropractic are occasionally being used too.⁹

⁴ Ibid

⁵ Ibid

⁶ IAAF, IAAF Medical Manual, chapter 9

⁷ IAAF, IAAF Medical Manual, chapter 9

⁸ Järvinen TA, Järvinen M, Kalimo H. Regeneration of injured skeletal muscle after the injury. *Muscles, Ligaments and Tendons Journal*. 2013;3(4):337-345.

⁹ Matthew Lambert, Rebecca Hitchcock, Kelly Lavalley, Eric Hayford, Russ Morazzini, Amber Wallace, Dakota Conroy & Josh Cleland (2017) The effects of instrument-assisted soft tissue mobilization compared to other interventions on pain and function: a systematic review, *Physical Therapy Reviews*, 22:1-2, 76-85,

Common Misconceptions and the Need for Advances

While the science of STIs is well established, misconceptions are common among patients and sometimes even providers, especially general practitioners.

Among the most common misunderstandings are that STIs will heal in a matter of weeks. The reality is that healing, including remodeling of the tissue, can take an extended period, sometimes more than a year¹⁰, and complete healing may never occur depending on treatment, type of injury, age, lifestyle, and other factors.^{11, 12}

One study found that only 12 percent of people with soft tissue neck injury experienced complete recovery more than a decade after their accident.¹³ Another study of patients with whiplash found that 70 percent complained of symptoms related to the original injury 15-½ years afterward.¹⁴

Another frequent myth is that soft tissue injuries will resolve spontaneously with no long-term effects. While this may be the case with minor injuries, many people experience residual and/or chronic symptoms including pain as well as loss of strength, function, flexibility, mobility, reaction time, or balance. Movement compensations for these deficits can lead to a cascade of other issues.^{15 16 17}

That is why the rehab community continues to seek to elevate the standard of care. Venus Concept is an innovation leader in energy-based medical technology, and our research has focus on a patented combination of two modalities that deliver synergistic benefits for STIs—multi-polar radio frequency (RF) and pulsed electro magnetic fields (PEMF).

¹⁰ The Healing of Injured Soft Tissues, Chiro Trust, 2014 Jan., Retrieved from <https://chiro-trust.org/whiplash/healing-injured-soft-tissues-including-neck-back/>

¹¹ Kraemer, William, Craig Denegar, and Shawn Flanagan. "Recovery From Injury in Sport: Considerations in the Transition From Medical Care to Performance Care." *Sports Health* 1.5 (2009): 392–395. *PMC*. Web. 24 May 2018.

¹² Studin, Mark. "Soft Tissue Injuries: What are they and the Long-Term Impact of Bodily Injury," Retrieved from uschirodirectory.com/index

¹³ M. F. Gargan, G. C. Bannister, "Long-term prognosis of soft tissue injuries of the neck." *J Bone Joint Surg Br.* 1990 Sep; 72(5): 901–903.

¹⁴ B. Squires, M. F. Gargan, G. C. Bannister "Soft tissue injuries of the cervical spine. 15-year follow-up." *J Bone Joint Surg Br.* 1996 Nov; 78(6): 955–957.

¹⁵ Ann E. Hansen, Norman J Marcus; "Is It Time to Consider Soft Tissue as a Pain Generator in Nonspecific Low Back Pain?", *Pain Medicine*, Volume 17, Issue 11, 1 November 2016, Pages 1969–1970, Retrieved from <https://doi.org/10.1093/pm/pnw204>

¹⁶ Myofascial pain syndrome, Mayo Clinic, retrieved from <https://www.mayoclinic.org/diseases-conditions/myofascial-pain-syndrome/symptoms-causes/syc-20375444>

¹⁷ Sexton, John. "Managing Soft Tissue Injuries." *Emergency Nurse.* 10, 1, 11-16. doi: 10.7748/en2002.04.10.1.11.c1057.

PEMF and Multi-polar RF Breakthrough for Soft Tissue Injuries

Multi-polar (MP) radio frequency offers homogenous deep-tissue heating resulting in tissue regeneration and remodeling. PEMF is a non-thermal approach that induces electro magnetic field in the target tissue resulting in stimulation of connective tissue, blood vessels, and muscles. Each of these are well validated approaches, but when used in conjunction, the two therapies work synergistically to repair affected tissue.

Especially when accompanied by massage, superior soft tissue injury rehabilitation is achieved. RF through thermal action spurs tissue metabolism, blood perfusion and lymphatic drainage as well as synthesis of new collagen and tissue fibers. PEMF, by inducing an electrical charge, results in increased collagen synthesis by fibroblasts (the cells in connective tissue), the proliferation of fibroblasts and the formation of new blood vessels.

This approach addresses three important affected areas: connective tissue, muscles, and the vascular network.

SYSTEM	RF	PEMF	MASSAGE	SYNERGY
Connective tissue	Increased collagen synthesis	Stimulates early formation of connective tissue		Stimulates cellular processes and collagen synthesis for tissue repair
Vascular	Vasodilation and enhanced perfusion	Stimulates vascular network	Improves lymphatic drainage	Promotes angiogenesis, formation of growth factors, improves short and long term circulation to much tissue rehabilitation needs
Muscle	Reduces pain and spasm. Facilitates anabolic processes, increases blood flow		Breaks boundary layers and improves lymphatic drainage	Relieves pain, speeds healing, improves muscle recovery and strength

Under the Venus Concept approach, multi-polar RF is delivered with a handpiece featuring either four or eight electrodes, enabling energy to be delivered uniformly, three dimensionally and to precise depths. Therapeutic temperature is achieved quickly and safely. PEMF generates a magnetic field when electrical current flows intermittently. Automatic temperature control maintains therapeutically effective temperatures and achieves more consistent outcomes.

Contraindications

There are some patients who are not candidates for this combination modality.

Contraindications include:

- Fractures
- Moderate to severe ligament tears
- Post-surgery
- Pregnancy
- Chronic use of corticosteroids or beta blockers
- Pacemakers or other active implants
- Passive implant at treatment site
- Acute disease, fever, hematological disease

Conclusions

Specialists such as sports medicine physicians, athletic trainers, physiotherapists, chiropractors and other injury rehabilitation care providers see firsthand the devastating effects of STIs. You are dedicated to helping your patients return to pain-free living and full performance.

At Venus Concept, we work with top-tier practitioners in more than 60 countries worldwide. Your success is at the center of our mission. If you'd like to learn more about the potential of RF and PEMF to provide better care for your patients with soft tissue injuries, we invite you to get in touch with us at 888-907-0115.