

# Electrophysical Therapies for the Equine Athlete



Carrie Schlachter, VMD\*, Courtney Lewis, DVM

## KEYWORDS

- Equine athlete • Electrophysical therapies • Rehabilitation • Treatment

## KEY POINTS

- Electrophysical therapies are useful tools for therapy if used at the appropriate time and in the appropriate method.
- Some methods may be harmful to tissues during certain phases of healing.
- There is currently a lack of research in horses to support or reject the use of most of these modalities.



Video content accompanies this article at <http://www.vetequine.theclinics.com>

## INTRODUCTION

Rehabilitation is defined as restoring or bringing an animal to a condition of health or useful and constructive activity. A good rehabilitation program takes into account the possible causes for the injury. Although the specifics of this process can be difficult, the concepts are straightforward. Once the underlying cause of the injury is determined, a veterinarian can construct an appropriate rehabilitation plan and use the available electrophysical therapies to their greatest effect.

The when, how, and for how long of the electrophysical therapies can be simplified by understanding the goals and physical attributes of the modalities and the healing stages of the injured tissue. Most significant injuries have a 30-day inflammatory period, a variable filling-in phase (2–6 months), and then a hugely variable remodeling period (6 months to 2 years). Treating the horse correctly for the type and location of injury, and the stage of rehabilitation of the tissue, helps ensure full rehabilitation success.

From a functional perspective, the goals reflect the healing stages of the tissue. The first goal is to remove pain (inflammatory period). The second is to restore, maintain, or improve range of motion (controlled walking exercise, bodywork, other therapies). The third goal is to restore or improve strength (increased exercise,

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Circle Oak Equine Sports Medicine, Petaluma, CA, USA

\* Corresponding author.

E-mail address: [carrieschlachter@gmail.com](mailto:carrieschlachter@gmail.com)

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targeted rehabilitation techniques) in the injury and in the overall fitness level of the horse.

This article discusses when and how to use the most common electrophysical therapies in horses including transcutaneous electrical nerve stimulation (TENS), neuromuscular electrical stimulation (NMES), functional electric stimulation (FES), pulsed electromagnetic field therapy (PEMF), therapeutic ultrasound, laser therapy, shock-wave therapy, and vibration therapy.

## TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION

### *Origin*

The use of electricity for pain relief dates back to a story of an ancient Greek that stepped on an electric fish and noted a significant improvement in his own pain. This led to the development of the “electreat,” a machine that was used through the early nineteenth century that used electricity to treat all manner of ailments. In the early 1960s the first portable TENS unit was developed and marketed for in-home pain relief.

### *Mechanism of Action*

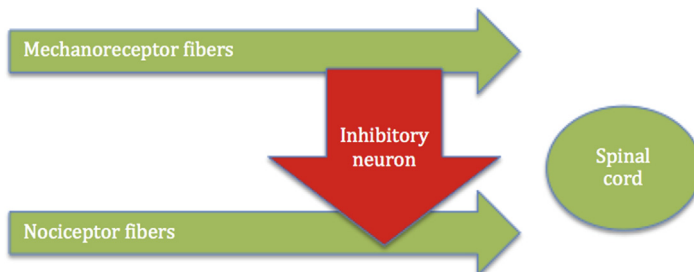
Electrostimulation provides pain relief primarily via segmental inhibition through pain gating mechanisms<sup>1</sup> (Fig. 1). This relies on activation of larger diameter fibers in peripheral nerves, which in turn helps block nociceptive activity in smaller afferents. Secondly electric stimulation of peripheral nerves can stimulate a central release of endogenous opiate-like substances, which can have a descending inhibitory effect on pain.<sup>2</sup>

### *Treatment Protocols*

Treatment parameters are based on electrical stimulation in the low-frequency range (<250 Hz) using appropriate pulse durations and intensities to activate the desired nerves. Large-diameter sensory nerves are activated first because of their proximity to the skin surface. Secondly motor nerves are activated, then nociceptor nerves are affected via the pain gating mechanisms.<sup>1</sup>

### *Potential Complications*

The contacts can cause skin irritation if left on for too long, so care should be taken to inspect the area of treatment regularly for evidence of irritation. Otherwise the modality has minimal complications when used properly.



**Fig. 1.** Gate control theory. Mechanoreceptors can override the nociceptor pain response via presynaptic inhibition.

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