

# FACTSHEET

## SHOCK WAVES

BY STACEY OKE, DVM, MSC; REVIEWED BY SARAH LE JEUNE, DVM, DIPL. ACVS, ECVS, ACVSMR, CVA, CVC

### **BENEFITS OF EXTRACORPOREAL SHOCK WAVE THERAPY IN HORSES**

Learn the newest information about shock wave therapy for helping horses heal

**C**lassified among physical therapy/rehabilitation techniques, extracorporeal shock wave therapy (ESWT) remains an important tool for helping manage a variety of equine conditions/injuries.<sup>1</sup> Issues amenable to ESWT in horses include, but are not limited to:

- ◆ Tendinopathy/tendinitis, a leading cause of injury in athletic horses;
- ◆ Desmitis (ligament injuries, inflammation), especially where ligaments insert onto bone (e.g., chronic injury/inflammation of the suspensory ligament located at the back of the cannon bone);
- ◆ Osteoarthritis (OA, degenerative joint disease), including bone spavin (OA of the lower hock joint);
- ◆ Bone injuries such as stress fractures of the outer portion of the cannon bone (dorsal cortical stress fractures) and incomplete fractures of the sesamoid bones;
- ◆ Navicular disease or, more accurately, podotrochleitis; and
- ◆ Deep muscle pain.

As you can see, this list primarily involves musculoskeletal conditions. Musculoskeletal injuries occur commonly in horses and all too frequently result in loss of use, early retirement, or even euthanasia. Combined with the fact that some injuries, such as lesions involving the superficial digital flexor tendon, have a propensity to recur despite extensive rest and controlled exercise programs,<sup>2</sup> modalities such as ESWT continue to gain popularity in managing them.

Studies also support the use of ESWT in wound-healing. Many wounds affecting the lower parts of the equine limb heal slowly and often develop some degree of excessive scar (granulation) tissue, commonly referred to as proud flesh.

As with any intervention, seek your veterinarian's advice prior to instituting any type of therapy to avoid further compromising your horse's well-being.

#### **WHAT IS ESWT THERAPY?**

Described as both safe and effective, ESWT involves applying shock waves to an injured area of the body. Shock waves are intense, but short, energy pulses that travel so quickly—a whopping 1,500 meters/second—they literally break the sound barrier. This is the same event that occurs when airplanes break the speed of sound, except in a much smaller format. The “extracorporeal” part of the name simply refers to the fact that the shock waves are generated outside the body.

A probe attached to a generator unit applies the shock waves directly to the injured region of the horse. Shock wave machines often have several probes capable of delivering shock waves to different tissue depths. This allows veterinarians to treat superficial injuries, such as wounds or lower limb tendons that are close to the skin's surface, as well as deeper injuries, such as to muscles or back joints.



**Shock wave therapy is used to treat a variety of equine musculoskeletal issues and wounds.**

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Veterinarians can adjust various settings on the shock wave unit to tailor the therapy to a horse's individual needs. The three main settings vets need to consider include:<sup>1</sup>

- 1. Energy and focal area**, which are frequently expressed in terms of energy per area (or energy flux density, EFD) and measured in millijoules (mJ) per mm. Shock wave generators can vary significantly in the amount of energy they produce and the size of area in which that energy is deposited.
- 2. Impulses** are the number of shock waves delivered per session. Depending on the underlying pathology, the impulses delivered can vary from 500 to several thousand.
- 3. Focus depth**, as alluded to previously, indicates how deep the shock waves penetrate the horse's body. Standard depths range from 0 mm to approximately 110 mm.

While practitioners have devised various treatment protocols—delineating not only energy, number of impulses, and focus but also number of treatments and days between treatments—these provide only general guidelines. Due to the lack of science-based evidence supporting exact protocols, vets typically must modify ESWT schedules to fit each patient's individual needs and therapy response.<sup>2,3</sup>

#### **HOW ESWT BENEFITS HORSES**

Extracorporeal shock wave therapy is widely used; however, its exact mechanisms of action remain unknown. One theory is that the shock waves impact cell-to-cell communication by altering the expression of various molecules, such as growth factors and cytokines, to promote healing.<sup>3</sup> To test this theory, one research group created wounds in both forelimbs of horses. They treated one forelimb with ESWT and left the other untreated. The researchers measured the levels of various genes involved in wound-healing throughout the study.

A recently published review article<sup>1</sup> explained that ESWT impacts not only growth factors that result in healing but also mediators that support blood vessel growth (angiogenic cytokines). It also increases

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the number of bone-producing cells (osteoblasts); recruits stem cells to facilitate healing of various tissue types; and appears to provide pain relief.

Research to more definitely describe mechanisms of action to maximize a patient's benefit from ESWT remains ongoing.

### OUTCOMES FOLLOWING ESWT APPLICATION

In one study researchers reported that 79% of horses diagnosed with bone spavin (59/74) had an improved lameness score following ESWT. In another they reported successfully treating chronic suspensory desmitis in 80% of affected horses (24/30) after only three ESWT sessions.<sup>1</sup>

Studies on experimentally induced OA support the use of ESWT, and it's therefore been included in the armamentarium for managing this painful, debilitating, incurable condition.

Another factor that complicates our ability to predict outcomes following ESWT is that veterinarians and managers frequently combine it with other rehabilitation strategies, such as heat and cold therapy, exercise regimens, stretching, massage, laser, therapeutic ultrasound, and more.

Even stem cell therapy appears to have success when combined with ESWT; researchers identified increased adipose-derived stem cell growth following ESWT in a laboratory setting.<sup>6</sup>

### IMPORTANT CONSIDERATIONS WHEN APPLYING ESWT

Regardless of the horse's injury, one of the most important predictors of outcome is an accurate diagnosis.<sup>1</sup> Simply assuming a horse has a specific injury or condition and treating the area with ESWT will unlikely lead to the optimal desired result, such as return to peak performance.

Ongoing follow-up examinations to adjust the horse's rehabilitation schedule will also help improve his outcome.<sup>1</sup>

Preparing the affected site properly helps enhance the sound waves' penetration of that area.<sup>1</sup>

When treating navicular disease, for example, veterinarians recommend trimming the frog and wrapping the foot in a wet bandage overnight. This softens the frog and ultimately improves the sound waves' penetration

through the superficial tissues to reach the deeper tissues where the navicular bone lies. Similarly, many horses receiving treatment for tendon, ligament, and muscle pain might reap maximal benefit from ESWT if the site is clipped and cleaned prior to applying the probe.

In many cases, horses require sedation during ESWT. And, as with other physical therapy/rehabilitation modalities, only trained professionals should apply ESWT.<sup>7</sup>

### RESOURCES

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- Delivers high-energy, focused shock waves to customizable depths (up to 110 mm)
- Used at more veterinary universities and clinics worldwide
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<sup>1</sup> Allen, K Virginia Equine Imaging • <sup>2</sup> Turner T, Anoka Equine Veterinary Services  
<sup>3</sup> McClure S, et al. 2004 AAEP • Proceedings. Vol. 50 • ©2017 PulseJet Technologies

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