

## Extracorporeal Shock Wave Therapy

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Extracorporeal shock wave therapy (ESWT) is a noninvasive modality used to stimulate healing, particularly in ligament, tendon, or bony structures.

A shock wave is a high-energy sound wave that rapidly increases pressure as it travels through tissue. Generally, shock waves are generated by a carefully controlled spark within a fluid-filled probe, which then sends a focused sound wave through the tip of the probe and into the body. Because these energy waves are generated from outside the body, this therapy is referred to as extracorporeal.

Firing shock waves repeatedly at tissue creates micro-trauma, which stimulates an increase in blood flow and new blood vessel formation in the target area. Improved blood supply and provision of tissue nutrients are important features of every healing process.

Although ESWT's exact mechanism is not yet fully understood, researchers have identified specific biologic tissue responses including the release of inflammatory cytokines and growth factors, as well as regulation of tumor necrosis factor, interleukin, and bone morphogenic protein. All these substances stimulate active tissue inflammation and, thus, stimulate the healing process.

While not a total panacea, ESWT does elicit active inflammation in a chronic, nonhealing injury—in effect, it jump-starts the healing process. ESWT has been proven to speed healing and improve healing quality.

### FOCUSED VS. NONFOCUSED ESWT

ESWT equipment varies depending on whether it generates focused or unfocused shock waves. Focused shock waves target a specific treatment area to deliver focused energy with deep tissue penetration—this is the preferred format for treating musculoskeletal problems.

A typical treatment protocol involves one to three treatments spaced at one- to three-week intervals. In contrast, nonfocused or radial pressure wave equipment provides variable and less intense energy waves with limited tissue penetration.

Nonfocused ESWT does not appear to appreciably affect bone remodeling or blood flow in deep tissues.<sup>1</sup> It might, however, be used to effectively treat some superficial injuries.

### APPLICATIONS

Although ESWT is best known for its value in managing proximal suspensory desmitis (inflammation of the suspensory ligament), veterinarians also use it to treat horses with various conditions such as tendon disease; degenerative joint disease of the distal hock, pastern, or coffin joints; collateral ligament injury; navicular syndrome; neck, sacroiliac, or lumbosacral injury; bone bruising; splint bone inflammation or fractures; bucked shins; or stress fractures. As an adjunct to multiple therapeutic approaches such as controlled exercise,



Studies have shown that ESWT can speed and improve quality of healing in horse.

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non-steroidal anti-inflammatory medications, hot/cold therapy, and/or joint injections, ESWT offers a supplementary strategy to help resolve orthopedic injuries.

**Musculoskeletal Treatment** Equine practitioners often use focused shock wave therapy when ligament or tendon injuries have failed to respond to other therapies, time, and rest. Controlled studies have demonstrated that ESWT application to significant soft tissue lesions stimulates healing with new collagen fibers and increased proteoglycan deposition, a main component of tendon or ligament repair.<sup>2</sup> ESWT also reduces inflammation and swelling associated with soft tissue and joint injuries.

Veterinarians might be able to improve biologic regenerative therapy results by pretreating a ligament or tendon lesion with ESWT, then injecting stem cells or platelet-rich plasma, for instance, that provide a scaffold for tissue repair. After a prescribed rest period, the practitioner can follow up with two more ESWT treatments.<sup>2</sup>

ESWT also has shown promise for improving soundness in horses with chronic or debilitating osteoarthritis. ESWT does not modify degenerative joint deterioration's disease process, but when used in combination with other therapeutic medical approaches, studies have shown that horses receiving ESWT showed improvement in comfort and gait.<sup>3</sup>

**Pain Control** Controversial discussions exist about the role ESWT plays in providing pain relief following treatment. Studies have shown that ESWT is a useful noninvasive treatment modality for managing issues such as back pain.<sup>4</sup> The concern for racehorses and sport horses, however, is that ESWT's pain-relieving effects could mask pain. This could enable a horse to overuse an injured limb

### Fast Fact

*Recent study results illustrate that ESWT relieves pain for 8 to 48 hours post-treatment.*

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with the potential for catastrophic breakdown.<sup>5</sup>

Additionally, this pain relief might give an ESWT-treated equine athlete an unfair advantage over other competitors. Recent study results illustrate that ESWT relieves pain for 8 to 48 hours post-treatment, but after 48 hours lameness returns to pre-treatment levels.<sup>3</sup>

As researchers continue to examine ESWT's pain-relieving effects, regulatory rules have evolved to accommodate new information. There is a wide variation in horseracing regulations and use of ESWT, and owners and trainers should refer to individual state regulations. In nonracing performance and sport horses, consult associated regulatory bodies for regulations regarding competition and the use of ESWT.

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Veterinarians recommend avoiding treating noninjured tissue whenever possible and to restrict exercise following recent treatment.<sup>6</sup> Best results are obtained using focused ESWT units that target a very specific area of concern with minimal effects on surrounding normal tissue.

**Wound Management** Another application of focused ESWT is directed at superficial wound care.<sup>7</sup> Recent findings suggest that ESWT does not accelerate lower limb wound healing; however, studies demonstrated that less exuberant granulation tissue (proud flesh) developed on treated wounds, and treated tissue appeared healthier than nontreated controls.<sup>8</sup> Thus, ESWT doesn't necessarily speed up healing but it prevents conditions that might otherwise delay healing and epithelialization (skin cells covering the wound).

Shock wave therapy might have another benefit as an antibacterial treatment. Some veterinarians believe bombarding a wound with shock waves weakens bacterial cells' protective barriers to diminish microbial contamination and infection.<sup>9</sup> This has exciting clinical implications for managing chronic, nonhealing wounds.

## THE FUTURE OF ESWT

As researchers continue to study ESWT, additional applications—including treating spinal conditions, for example—are demonstrating positive healing outcomes. ESWT applied in conjunction with known, effective medical therapeutic options has the potential to facilitate rapid recovery in an injured horse. 🐾

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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 • ©2014 PulseVet Technologies, Alpharetta, GA.