High power laser therapy in tendon injuries - what is the evidence?

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Recently, the application of medical laser therapy has become increasingly popular in equine orthopedics. At the cellular level, penetrated laser light gets absorbed by photo-acceptors, and triggers a cascade of biophysical effects such as activation of photons, synthesis of collagen and other proteins, increased cAMP levels, and cellular proliferation. As a result, medical laser therapy is deemed to accelerate cellular regeneration and thus healing[1]. This is called the photo-bio-modulation effect. Presently, many devices are on the market, all with different application protocols with regard to power, application duration, and emitted wavelengths. Low-level laser therapy (LLLT, power output of <500mW) has already been applied in equine orthopedics for many years[2].
The last few years, more and more scientific peer-reviewed literature has become available on high power laser therapy (HPLT, output >500mW). HPLT typically applies a much higher power output when compared to LLLT. This enables deeper tissue penetration, making it possible to produce an electromagnetic field of stable photo-bio-modulation under the skin, where the photo-acceptors are positioned, which is deemed necessary for achieving a proper healing effect[3].

Also, the higher energy levels that are delivered per unit of time are thought to make the therapeutic process more efficient. Several human studies have been performed on the biophysical effects of HPLT. Larkins et al. showed an increased limb blood flow after radiation with HP laser[4]. In a study performed by Conforti et al., a significant reduction was observed on VAS-pain scoring after HPLT treatment versus conventional simple segmental physical rehabilitation in patients suffering from whiplash injury[5]. Another study showed significant analgesic effects of HPLT treatment in patients suffering from Achilles tendinosis [6]. Pryor studied the effect of HPLT in a wide variety of musculoskeletal injuries such as knee osteoarthritis, lumbar spondylosis, cervical spondylosis, frozen shoulder, plantar fasciitis, and leg sprains[1]. Roberts et al. suggest that HPLT is useful for the long term relief of the symptoms associated with chronic epicondylitis [7]. Patients diagnosed with subacromial impingement syndrome showed a significant reduction in pain and improvement in joint functionality and muscle strength of the affected shoulder after HPLT, compared to participants receiving ultrasound therapy [8].

Recently, we described the outcome in 150 sports horses suffering from tendon injury (either superficial digital flexor, deep digital flexor or suspensory ligament) and treated with the HPLT FP4 System laser device (maximal power output 15W) [9]. Laser therapy was uneventfully applied in all horses with no skin burns, pain reactions or other adverse effects noticed. Application of high-power laser therapy therefore could be classified as a safe procedure in this population of horses. There was a statistically significant overall improvement in both lameness and ultrasonographic appearance the day after cessation of laser therapy (week 2) and 4 weeks later (week 6), across all types and stages of tendinopathy or desmopathy. The improvement manifests after a much shorter time interval than described in literature for other treatment modalities. Rehabilitation time was shorter than described in the literature. The median time for horses to return to exercise in our study was six weeks and time to return to the previous performance level was six months.

Re-injury rates (at previous lesion location) after 6, 12 and 24 months were respectively 16.8%, 21.0% and 18.2% These are within the lower range of previously published studies on several other treatment modalities [9].

HPLT seems a promising treatment modality for the healing of tendon tissue, which is notorious for its tendency to heal very slowly and for suffering re-injury when horses go back to their prior level of exercise. However, most of the fundamental work has been done in non-equine species, and extrapolation to equine tendon lesions should be done cautiously. Tendon lesions in horses are quite distinct from typical human tendon injuries. Moreover, the level of evidence thus far does not include results from randomized controlled trials. Therefore, our group is currently studying the effects of multi-frequency high power laser on standardized surgically induced lesions in the suspensory branch of the horse in a controlled setting.

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