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## New Hope Now for Bowed Tendons

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Ultrasonography is a well-established, valuable tool for diagnosing the type and severity of tendon and ligament injuries in horses.

Its use as part of a rehabilitation program can help the veterinarian, trainer and owner successfully return the horse to competition, minimizing the chances of the horse's returning successfully to its previous level of competition.

Beta-aminopropionitrile (BAPN) is a scar-remodeled drug which has been shown to improve the quality of tendon and ligament repair in horses.

BAPN is found in seeds of the wild sweet pea, *Lathyrus odoratus*. BAPN, administered in the early stages of scar formation, blocks the enzyme lysyl oxidase and thus blocks the formation of collagen cross-links in the area of injury. This brief interruption of collagen cross-linking allows for physiologically beneficial scar remodeling to occur.

Clinical trials using beta-aminopropionitrile fumarate (BAPN-F) in horses with acute bowed tendons have demonstrated improved tendon healing. Carefully designed double-blind placebo controlled trials showed the efficacy of this treatment. These studies are an important new application of ultrasonography and should help veterinary medicine make significant advances in the treatment of tendon and ligament injuries in horses.

Double-blind placebo controlled trials have not previously been performed to evaluate the efficacy of other treatments for tendon and ligament injuries.

More than 200 horses with a recent injury (one to three months) to the superficial digital flexor tendon have been treated with intralesional BAPN-F (Alcoa Inc., Tucson, AZ) following the tendon injury, primarily at the University of Pennsylvania School of Veterinary Medicine at New Bolton Center in Kennett Square, PA by my coworkers and me, and at Randall Veterinary Hospital in Warrensville Heights, OH, by Dr. Ron Genovese and his coworkers. This drug has also been administered to horses with other tendon and ligament injuries.

All horses were racing, training or involved in other types of equestrian competition at the time the injury occurred. The majority of treated horses were racehorses.

The treated horses had large areas of damage to the superficial digital flexor tendon. Affected tendons were at least 50% larger than normal or the cross-sectional area of the affected tendon was at least 1.5cm. The lesion involved at least 25% of the tendon's cross-sectional area at its worst and extended over at least three of seven zones.

Following a sterile prep, BAPN-F was injected throughout the injured area with a 27-gauge needle every other day for a total of five treatments.

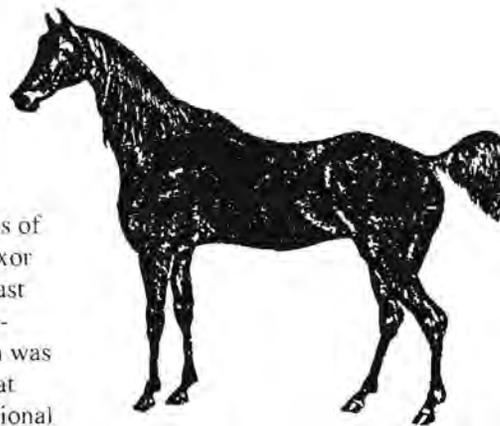
Horses were then placed in a rigorous low-level controlled exercise program with frequent ultrasound monitoring. The treated horses began walking 30 minutes per day for four weeks, which then increased to 45 minutes daily for another four weeks. All subsequent increases in the horse's exercise were based upon improvement in the ultrasound (sonographic) findings.

If sonographic improvement was detected eight weeks following treatment, a small amount of jogging (no more than five minutes per day at a five to six minute per mile pace) or swimming exercise was added to the exercise program. This was increased to 10 minutes per day if sonographic improvement was detected at 12 weeks.

If continued sonographic improvement occurred at 16 weeks, then turnout in a small paddock was permitted. The amount of jogging exercise remained stable or continued to increase by five minutes per month until 24 weeks.

If continued sonographic improvement occurred at 24 weeks, the horses started galloping. The first start occurred no sooner than 40 weeks following treatment and was longer in horses with more severe injuries.

Follow-up ultrasound examinations revealed a better quality of tendon repair in the BAPN-F treated horses, when compared to placebo controls.



Tendon cross-sectional area was significantly decreased, and fiber alignment was improved significantly at 16 weeks in horses treated with the seven or eight-mg doses of BAPN-F. These findings persisted as the horse went on into more rigorous training.

Any increase in tendon cross-sectional area (thickening) between examinations resulted in the horse remaining at the same exercise level for an additional four weeks, unless the increase in tendon cross-sectional area was greater than or equal to 25%, in which case the amount of trotting exercise was decreased or discontinued altogether for the subsequent four weeks.

Increases in tendon cross-sectional area of this magnitude indicated excessive tendon loading for the stage tendon healing and increased the risk for re-injury.

A gradually increasing controlled exercise program should be a routine part of the rehabilitation of horses with tendon and ligament injuries.

Periodic ultrasound examinations should be performed prior to each increase in the horse's exercise level to be sure that the horse is ready to advance to the next exercise level.

Long-term follow-up data is still being obtained on these horses to evaluate their return to performance. But initial studies indicate a significantly high percentage of BAPN-F treated horses are able to return successfully to competition without recurrence of the injury, the ultimate goal of the treatment of equine athletes with tendon injuries. ■