Clinical Case Series
Adipose Derived Stem and Regenerative Cells
for the Treatment of
Equine Tendon and Ligament Injuries

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Abstract: Injuries to tendons, ligaments and the structures associated with joint movement are common and frustrating problems encountered in equine clinical practice. Conventional therapies often do not yield consistently satisfactory results in halting the inevitable breakdown of the affected region, leading either to a decreased level of performance or even euthanasia. The pluripotent capabilities of adipose-derived stromal cells (ADAS) offer an innovative approach in the treatment of equine ligamentous injuries. Commercially available, ADAS cells have been used successfully in the treatment of equine tendonitis, suspensory ligament desmitis, sub-chondral bone cysts, and osteoarthritis. The purpose of this paper is to review individual clinical case studies and techniques for utilizing adipose derived stem and regenerative cells as a therapeutic modality in the treatment of equine ligament injuries and diseases.

Introduction: Traumatic injuries to the supporting structures of joints happens frequently as these are the regions under the greatest stress during the intense activities of the equine athlete.

Whether tendons and ligaments are strained repetitively or are severely injured in one single event, the outcome is unfortunately often the same. The healing of tendon or ligament typically involves inflammation followed by the deposition of collagenous scar tissue rather than return of adequately functioning tendinous or ligamentous tissue. Although the continuity of the tendon or ligament has been restored, fibrous connective tissue does not have the same strength or elasticity as that possessed by a normal tendon or ligament. This together with the formation of constricting adhesions predisposes a horse to reinjury and reduces its functional career longevity.

Stem cells in veterinary clinical practice have been utilized in the treatment of tendonitis with the initial source of cells derived from autologous bone marrow. Recently, adipose tissue has been described in academic literature as a rich source of Mesenchymal Stem Cells (MSCs). An innovative approach aimed at reducing the risk of scarring, optimizing the strength of damaged tendons and ligaments, and allowing equine athletes to return to a high level of performance has been the application of VetStem Regenerative Cell (VSRC) Therapy. Capable of differentiating into multiple cell lines, adipose derived stromal cells (ADAS) have been demonstrated to differentiate into bone, cartilage, tendon, and ligament in both in vitro and in vivo models.

Commercial use of equine VSRCs has been available since 2003. Based on patented technology, VetStem Biopharma, Inc. (Poway, CA) recovers a cell population of adipose derived pleuripotent stem cells, endothelial progenitor cells, pericytes, and associated growth factors from fresh submitted lipectomy samples and returns those cell populations to the practitioner within 48 hours of tissue collection. The purpose of this paper is to review individual clinical case studies and techniques for utilizing adipose derived VetStem Regenerative Cells as a therapeutic modality in the treatment of equine suspensory ligament injury and disease.
Case 091603-01: 3 Year Old Thoroughbred Racehorse
Traumatic Tendonitis

On August 8, 2003, a 3 year-old thoroughbred mare presented for evaluation of a large tendon bow in the right front limb. While in formal training, the patient had become acutely lame during a workout the previous week. The bow was treated utilizing non-steroidal anti-inflammatory medications along with hydrotherapy several times daily and topical poultice applications.

At the time of examination, the initial swelling had decreased, however a significant bow was present in the mid cannon region of the right front limb. Physical examination revealed the horse to be lame at a walk, the affected region was painful upon manipulation, and mild dependent edema was present in the distal limb. Ultrasound evaluation of the right front flexor tendons revealed a prominent core lesion of the superficial digital flexor tendon extending through zones 2B (Fig 1) and 3A.

The patient was discharged with instructions to limit activity to stall rest only, continue oral and topical anti-inflammatory therapies and to re-evaluate in 30 days.

Physical examination on September 15 found persistence of focal swelling of the mid cannon flexor region while ultrasound evaluation of the right front flexor tendons revealed no changes in the lesion size or characteristics within any region. Utilizing moderate sedation and local anesthesia, 16 grams of subcutaneous adipose tissue were recovered from a region dorso-lateral to the tail head and submitted for stem cell recovery.

On September 17, 2003 20 million viable cells were delivered to the core lesion by ultrasound guided injection. The horse was discharged with instructions to limit activity to stall rest for 1 week and then to initiate a physical rehabilitation program.

Ultrasound evaluation on October 22 revealed filling of the original injury in both zones 2B and 3A with uniform normo-echoic tissue, improved fiber pattern linearity on longitudinal view, and decreased peri-tendonous swelling.
During the following 6 months, the horse continued through a progressive rehabilitation program consisting of incrementally increasing periods of hand-walking, automated walkers, and eventually brief periods of controlled turn out.

Ultrasound evaluations were performed at 30 day intervals from October 2003 through March 2004. (Fig 2 Three month post treatment ultrasound).

Ultrasound evaluation in November 2004 (Fig 3) revealed resolution of the original lesion, complete filling by normal appearing tissue, normal fiber pattern alignment on longitudinal view, and overall normal appearance of the affected tendon when compared to the normal limb.

After a 15 month rehabilitation from the time of stem cell therapy, the patient was officially returned to training; recording 13 workouts between January and May of 2005.

In May of 2005, the filly recorded her first ever race and raced three times in May and June recording 1 win, 1 place, and 1 show. Following a successful return to racing, the mare was sold in July of 2005 and transferred training staff.
Case 030104-01: 7 Year Old Dutch Warmblood Show Jumper
Acute Tendonitis

On February 19, 2004, a 7 year-old, Dutch Warmblood show jumper presented with acute right forelimb lameness after a performance. Lameness and ultrasonographic evaluation revealed a lesion in the right front superficial digital flexor tendon extending from zone 2A to 3A with the maximal injury zone (MIZ) being located at zone 2B. The total cross-sectional area at the MIZ was 1.44 cm² and the core lesion area was .46 cm², or 31.9% of the tendon cross-sectional area. Based on ultrasonographic appearance, a diagnosis of acute tendonitis of the superficial digital flexor tendon was made (Figs 1, 1a). The 32% core lesion led to a guarded prognosis for return to full performance, and estimated rehabilitation time was 9-12 months.

After review of the case and desire for return to full work by the owner, a decision was made to use regenerative cell therapy to reduce the risk of scarring and optimize the strength of the tendon. A 20.75 gram sample of subcutaneous fat was removed from the area lateral to the tailhead and submitted to VetStem Biopharma, Inc. for stem and regenerative cell recovery. Upon receipt of the therapeutic dose containing 5.6 million regenerative cells, the attending clinician injected the SDF lesion using ultrasound guidance. A total volume of 2.4 mL was administered, split into four sites. Following the injections, a rehabilitation program was instituted with 5 minutes twice daily hand walking the first month with a progressive program of exercise and monthly ultrasound evaluations.
At one month post therapy, the ultrasonographic appearance was substantially improved with filling of the defect and normalization of the fiber pattern (Fig 2, 2a). The total cross-sectional area was reduced to 1.26 cm² and by 90 days had returned to normal at .91 cm². The horse continued to improve and by month 4 was returned to work under saddle. At month 6 the horse returned to full work schedule and subsequently returned to show jumping performance.

Five Weeks Post Treatment

Figure 2: SDFT
March 25, 2004

Figure 2a: SDFT, Longitudinal View
March 25, 2004
A seven-year-old Paint reining horse was presented for severe acute lameness in both front limbs. On examination, the animal was a grade 2/5 lame on the left front and 3/5 on the right front. An ultrasound evaluation determined that significant injury had occurred to the distal 1/3 of the left front and to the mid-portion of the right front superficial digital flexor tendons (SDF). There was a loss of echogenicity of the SDF in both limbs with the right SDF having the more severe injury. (Fig 1). Based on ultrasound evaluation, a diagnosis of acute tendonitis was made. With the lack of linear fiber pattern and the extent of injury in both SDF, the prognosis for returning to prior performance level was guarded.

Initially, this horse owner elected conservative therapy. Two months after injury there was no change in the ultrasound appearance; the owners expressed interest at this time for returning their horse to full work and the staff veterinarian decided to use regenerative cell therapy. Their hope was to reduce the risk of scarring and to optimize the strength of the tendons. A 17.7 gram sample of subcutaneous fat was removed from the area lateral to the tail head and submitted to VetStem Biopharma, Inc. for stem and regenerative cell recovery. The veterinarian utilized ultrasound guidance and injected both the left and right front SDF tendons with harvested cells. A therapeutic dosage of 3.2 million regenerative cells contained in a 2 ml volume was administered to each tendon. The owner also elected to have superior check desmotomies performed at the same time to help prevent future injury to the SDF tendons.

Following the regenerative cell injection, a rehabilitation program was instituted. At the two month recheck exam, there was no pain elicited on palpation and no lameness was detected. An ultrasound performed at the two months post-injection exam showed significant improvement in the appearance of both the left as well as the more severely affected right front SDF (Fig 2). Specifically, there was filling in of the lesion as well as a more normal pattern of the fibers. The owner was instructed to discontinue working the horse under saddle at this time in order to limit strain and allow the tendons to heal.

This reining horse continued to steadily improve after regenerative cell therapy was administered and has now returned to a full work schedule only 8 months after therapy.
Case 020805-01: 19 Year Old Dressage Horse
Superficial Flexor Tendonitis

On February 7, 2005, a 19 year-old Dutch Warmblood gelding presented for lameness evaluation. Previously competing in Gran Prix level Dressage, owner interview revealed the horse suffered an acute bow of the left front limb in November 2004. Following ninety days of stall rest, the owner presented the horse as a candidate for stem cell therapy. Ultrasound evaluation of the left front flexor tendons revealed a centralized lesion of the superficial digital flexor tendon extending from zone 1A to 2A.

Under moderate sedation and local anesthesia, 19 grams of subcutaneous adipose tissue was recovered from the left coccygeal region, dorso-lateral to the tail head and submitted for stem cell recovery. On February 9, 2005, 8 million viable cells were delivered to the lesion by ultrasound guided tendon injection. The patient was discharged and stall rested for 10 days.

Evaluation on February 21, 2005 found the flexor tendon region to be normal in appearance, absent of swelling or edema at the site of stem cell injection. Evaluation of the collection site revealed excellent skin apposition, no discharge, or swelling. A rehabilitation program of gradually increased hand walking was initiated with ultrasound evaluations scheduled at 30 to 60 day intervals.

Ultrasound evaluation of the left front flexor tendons on March 21 (6 weeks following stem cell therapy) revealed marked improvement in sonographic appearance of the tendon. On lameness exam, the patient was observed to be sound at the trot. The rehabilitation program was increased to include trotting and cantering by 8 weeks post treatment.

On May 23, 2005, ultrasound evaluation showed marked improvement in echogenicity of the superficial flexor tendon in Zone 1A. On longitudinal view, pattern alignment was noted to be improving and approaching normal alignment. On lameness evaluation, the horse was sound at a walk, trot, and canter.

In June of 2005, the owner returned the horse to its original fitness and training program. Following 90 days of conditioning, in September of 2005 the owner and horse returned to Gran Prix level competition and have been actively showing for 3 months without any indications of residual lameness or discomfort.

Note: Images were lost due to computer hard drive failure at the clinic.
Case 041905-02: 6 Year Old Cutting Horse
Traumatic Suspensory Ligament Desmitis

On April 7, 2005 a 6 year-old American Quarter Horse gelding presented for lameness examination. According to the owner's report, the horse was shown at a cutting event the previous evening and became very sore in the left hind limb. Previous radiographs of the left hind limb revealed no bony changes to the tarsal or metatarsal structures. Ultrasound evaluation of the left hind flexor tendons on April 11 revealed the following findings: enlargement of the body of the suspensory ligament in the mid-cannon region that measured twice as thick as the dorso-plantar aspect when compared to the contalateral limb, a mixed echogenic pattern characterized by multiple, ill-defined hypoechoic regions, and a disrupted fiber pattern in both longitudinal and transverse views (Fig 1, 2, 3).

Based on ultrasound appearance, a diagnosis of focal, traumatic suspensory ligament desmitis was made and the prognosis for return to function was considered guarded. The estimated time required to return this gelding to function was 12 to 15 months. On April 18, 2005, 29.5 grams of subcutaneous adipose tissue was harvested lateral to the tail head and submitted for stem
cell recovery. On April 20, 26 million cells were injected to the site of injury by ultrasound guidance.

Following 2 weeks of stall rest, the horse began a rehabilitation program which consisted of alternating day aquatred therapy. At 30 day intervals, the horse was evaluated and the rehabilitation program was modified accordingly.

Physical examination on June 21, 2005 revealed the horse to be 2/5 lame at the trot with mild residual swelling around the suspensory region of the mid-distal metatarsus. Although a noticeable lesion still remained, ultrasound evaluation revealed an improved fiber patterning of the left hind suspensory ligament. (Fig 4).

![Figure 4: Suspensory Lesion, June 21, 2005](image)

Following 2 additional months of Aquatred therapy, ultrasound evaluation on August 20 revealed the following: filling of the original injury with uniform hyperechoic tissue, improved pattern alignment on longitudinal view, and decreased cross-sectional area. The prognosis for return to function was upgraded from guarded to fair-to-good (Fig 5, 6).

![Figure 5: Susp Lesion August 20, 2005](image)

In the following weeks, the rehabilitation program was adjusted to include light riding under saddle by October 1. On October 5, 2005, with minimal soreness of the horse reported by the owner, clearance was given to return to a full level of activity. In October 2005, 6 months following the original injury, this Quarter horse gelding returned to his previous level of competition and successfully placed at a National Cutting competition. To date, he has been shown multiple times successfully without any signs of increased discomfort or lameness.
Case 021005-02: 14 Year Old Dressage Horse
Suspensory Desmitis & Adhesions Concurrent with Surgical Adhesion Takedown

On February 9, 2005, a 14 year-old Warmblood gelding was referred for lameness of the right hind limb. Diagnostic anesthesia by the referring veterinarian had isolated the source of lameness to the origin of the right hind suspensory ligament.

Magnetic Resonance Imaging (MRI) of the right hind limb distal to the tarsus revealed a small centralized tear at the origin of the suspensory ligament. In addition, the suspensory body was adhered to the mid portion and distal aspects of the cannon bone (Fig 1). Significant enlargement of the lateral splint bone on the axial surface was present with the presence of multiple blind splints (Fig 2).

Under standing sedation, 17.5 grams of subcutaneous adipose tissue was harvested from the region dorso-lateral to the tail head over the gluteal muscles on the left hind limb and submitted for stem cell recovery.

On February 11, under general surgery, multiple adhesions were broken down from the suspensory ligament origin, body, and lateral branch to the distal ½ of the cannon bone, proximal ¼ of the medial splint bone, and most of the lateral splint bone. Multiple blind splints were removed from the proximal medial splint bone as well as a large blind splint from the plantar aspect of the cannon bone, which had adhered to the suspensory ligament body. A centrally located tear in the proximal suspensory ligament origin was then injected with 420,000 viable cells using ultrasound guidance.

The horse was discharged on February 12 with instructions to restrict activity to stall rest for 2 weeks, followed by 5-10 minutes of hand walking for two weeks, and then increase walking periods up to 30 minutes per day over a 4 week period.
Ultrasound evaluation of the right hind limb on March 25 revealed significant healing of the tear within the proximal suspensory ligament origin, improved fiber patterning on longitudinal view, and no evidence of adhesion. The rehabilitation was modified to add 5 minutes of trotting to the daily exercise routine beginning at 60 days post procedure.

Ultrasound evaluation on May 5, 2005 revealed resolution of the lesion within the origin of the suspensory ligament, normal fiber patterning, and no evidence of adhesion formation. Lameness examination found the horse to be sound at the walk, trot, and canter. Following this evaluation, the horse was cleared to return to competition following a 6 week conditioning program.

In July 2005, both owner and patient returned to their previous level of competition.

Figure 3: September 2005
7 months post treatment
Case 122804-01: 11 Year Old Dressage Horse -Suspensory Ligament Desmitis with Avulsion Fractures

On December 27, 2004 an 11 year-old Warmblood gelding presented on referral for evaluation of a right front limb lameness of 2 months duration. The referring veterinarian had diagnosed moderate suspensory ligament desmitis. He localized the lesion to the body of the ligament and referred the horse for intralesional therapy.

Physical examination found the horse to be 2/5 lame in the right front limb. Ultrasound evaluation of the right front limb revealed a moderate origin desmitis with the presence of small bony irregularities suggestive of avulsion fractures, as well as additional changes observed in the body. The largest area of damage was localized to a region 14 to 16 cm distal to the accessory carpal bone (Fig 1).

An 18.5 gram sample of subcutaneous adipose tissue was harvested from the right gluteal region and submitted for stem cell recovery.

On December 29, 2004, 4.2 million viable cells were injected into the lesion by ultrasound guidance. The patient was discharged with instructions to stall rest for 14 days and then to follow this with gradual increases in hand walking.

Physical examination on February 9 (6 weeks following stem cell therapy) found the horse to be improved to a lameness score of 1/5. Ultrasound evaluation of the affected region revealed moderate increases in echogenicity in the body and origin lesions, with improved linearity of patterning on longitudinal examination of the ligament (Fig 2). The patient’s rehabilitation regimen was increased to include daily hand walking and walking under saddle.
On March 30, 2005 physical examination showed the horse to be increasingly improved, with only a 1/5 lameness in the right front limb noted when circling to the left. Ultrasound evaluation revealed generalized improvement in fiber pattern and echogenicity throughout the affected region (Fig 3). In the region 10 to 14 cm distal to the accessory carpal bone, short random linear echoes were still present with a slight increase in diameter still evident.

With instructions to return to walking for 4 additional weeks and then adding a trot sequence to the rehabilitation regimen, the horse was returned back to the supervision of its normal attending veterinarian.

Reports from the attending veterinarian on July 29 revealed resolution of the original lesion with only minute residual echoes present and physical examination found the horse to be sound at the walk and the trot. The owner and patient were cleared to return to their previous level of competition in August of 2005 (8 months following stem cell therapy) and have been successfully showing since that time.
Case 010406-01: 12 year Old Dutch Warmblood Desmitis of the Suspensory Ligament

On December 31, 2005, a twelve-year-old Dutch Warmblood mare was presented for evaluation of a grade 3/5 lameness in the right rear leg. The patient had become lame during a training session three days prior to evaluation. Ultrasound evaluation of the right rear leg revealed the following findings: a hypoechoic area and an enlargement in the suspensory ligament (level 1B), and on longitudinal evaluation, a linear hypoechoic enlargement region was found within the suspensory ligament. (Fig 1)

Based on the ultrasound appearance, a diagnosis of desmitis of the proximal suspensory ligament and of the lateral suspensory branch (ultrasound not pictured) was made and prognosis for return to prior level of competition was fair.

On January 3, 2006, 31.6 grams of subcutaneous adipose tissue were harvested from the coccygeal region, dorso-lateral to the tail head, and submitted for regenerative cell recovery. On January 5, 2006, 6.3 million viable cells were delivered to the damaged areas of the ligament by ultrasound guided injection.

Following a rehabilitation course (rest with light hand walking twice a day), phenylbutazone at 1 gram twice a day for one week post-injection was prescribed.
A reevaluation was performed on February 2, 2006. The patient was grade 1/5 lameness with no swelling noticeable of the right rear limb. On ultrasound evaluation of the 1B area (Fig 2), there was marked improvement in the echogenicity of the suspensory ligament on cross sectional and on longitudinal evaluation. On the longitudinal scan the linearity of the fiber pattern was very consistent with normal fiber patterns. This was only 26 days post-regenerative cell therapy and 34 days post-injury. The rehabilitation continued with increased workouts and some under saddle at 60 days. Reevaluation was scheduled to be done at 90 days post-injury.

The horse was presented for evaluation approximately 90 days post-injury. There was no detectible lameness at a walk or at a trot. Lunge line evaluation showed no lameness going in a circle left or right at a walk or trot. Ultrasound evaluation of the suspensory ligament at the 1B level showed much improved echogenicity of the ligament on cross section and longitudinal sections.(Fig. 3) At only 84 days post regenerative cell therapy, the echogenicities were comparable to the ultrasounds of normal ligaments. The rehabilitation was increased to include trotting under saddle and currently the horse has been performing at its prior level of competition.
Case 042606-03: Fifteen-year old Hanoverian Cross Suspensory Branch Desmitis

A fifteen-year-old Hanoverian cross dressage horse was presented for lameness in the right front limb. On examination, it was determined that MCIV had fractured at the distal aspect with significant displacement. An ultrasound evaluation determined that there was major damage to the lateral branch of the suspensory and minor changes to the medical branch subsequent to the fracture (Fig 1).

Based on the ultrasound evaluation, a diagnosis of acute desmitis was made. There was a 2 cm area of enlargement in the right lateral branch in comparison to the left. There was also a core lesion present in the right branch. The enlargement and core lesion gave the horse a guarded to fair prognosis for returning to competition.

After reviewing the clinical findings and with consideration of the owner’s expressed interest for returning their horse to full work, the staff veterinarians elected the use of regenerative cell therapy. Their hope was to reduce the risk of scarring and to optimize the strength of the ligament. An 8.91 gram sample of subcutaneous fat was removed from the area lateral to the tail head and submitted to VetStem Biopharma, Inc. for stem and regenerative cell recovery. After surgery was performed to remove the displaced bone, the attending clinician utilized ultrasound guidance and injected the lateral branch of the right front suspensory with harvested cells. A therapeutic dosage of 6.5 million regenerative cells contained in a 2 ml volume was administered.

Following the regenerative cell injection, a rehabilitation program was instituted. At the one month recheck exam, there was no pain elicited on palpation and no lameness was observed. An ultrasound performed at the 4 month post-injection exam (Fig. 2) showed significant improvement in the appearance of the ligament; there was filling in of the core lesion, decreased size of the lateral branch and an almost normal pattern of the fibers.

This patient continued to steadily improve after regenerative cell therapy was administered and has now returned to a full work schedule.

Figure 1: April of 2006
Figure 2: August 28, 2006
Case 042705-05: Five-year Old Reining Quarter Horse
Proximal suspensory Desmitis

A five-year-old Reining Quarter Horse was presented for chronic lameness in the right and left hind limbs. Physical exam determined the lameness to originate in the proximal suspensory ligament. On ultrasound evaluation both suspensory ligament origins showed the classic “moth-eaten” appearance of degenerative suspensory ligament desmitis (fig 1). Considering the patient had the same injury in both hind limbs, this horse had a guarded prognosis for returning to competition.

After reviewing the findings of both the physical exam and the ultrasound, the veterinarian decided to use regenerative cell therapy. His hope, as well as the owner’s, was that this specific type of therapy would reduce the risk of scarring, optimize the strength of the ligament, and allow the horse to return to his prior level of performance in a high impact sport.

An 18.18 gram sample of subcutaneous fat was removed from the area lateral to the tail head and submitted to VetStem Biopharma, Inc. for stem and regenerative cell recovery. With ultrasound guidance, the attending clinician injected both hind limbs at the origins of the suspensory ligaments. A therapeutic dosage of 3.7 million regenerative cells contained in a 2 ml volume was administered at each site.

Following the regenerative cell injection, a rehabilitation program was instituted. At the three month recheck exam, the attending veterinarian was unable to elicit pain on palpation or detect lameness at any gait. An ultrasound performed at this time showed significant improvement in the appearance of the ligament: there was filling in of the lesion, there was no evidence of the prior moth-eaten appearance of the ligament, and the development of a normal pattern of fibers was starting to appear. (Fig 2) This reining horse continued to steadily improve and returned to a full work schedule within 12 months of administration of regenerative cells.

Figure 1: April 2005

Figure 2: July of 2005
Case 051005-03: Seven-year Old Warmblood Hunter Jumper
Proximal Suspensory with Avulsion

A seven year old Warmblood Hunter-Jumper was presented for acute lameness of the left front limb. On physical exam, the patient was grade 2/5 lame to the left, right, and in a straight line. Flexion tests on that limb did not worsen the lameness. The horse exhibited pain on palpation of the area of insertion of the suspensory ligament of the left front limb. A high-volar block resolved 95% of the lameness. An ultrasound of the proximal suspensory was performed: it showed an hypoechoic area in zone 1A of the suspensory ligament. The core lesion measured approximately 0.18 cm squared and revealed a 0.3cm segment that had avulsed from MCIII. (Fig 1, 2)

With the intent of minimizing scarring in order to continue this horse’s career as a successful Hunter-Jumper, regenerative cell therapy was elected as the course of treatment.

On May 9, 2005 a 23.87 gram subcutaneous adipose sample was collected just lateral to the tailhead and was submitted for regenerative cell recovery. On May 11, 2005, 4.7 million regenerative cells were injected with ultrasound guidance directly into the core lesion and at the location of the tear. The patient was placed on 1 gram of phenylbutazone orally twice a day for three days.

The horse was given stall rest for 14 days and then subsequently hand walked twice a day for 30 minutes. On June 30, 2005, the patient was started on an Aquatred; the sessions lasted 20 minutes and occurred 3 to 4 times a week over the course of a month.

By August 2005, the patient was sound and had started back to light training. In December 2005, the Warmblood was back at her prior level of performance and is currently competing in Hunter-Jumper classes in Europe. No re-injury, pain or lameness issues to the left front suspensory have been reported since regenerative cell treatment.
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