PRIMUS gel

Conventional Treatment

Repair, *verb* **1.** fix or mend (a thing suffering from damage or a fault) causing (in a living organism) scarring and cicatrisation thus limiting its original functionality.

Primus Gel Treatment

Regenerate, *verb* **1.** (of a living organism) regrow (new tissue) to replace lost or injured tissue bringing it back to its original pristine condition and original function.

Primus Gel

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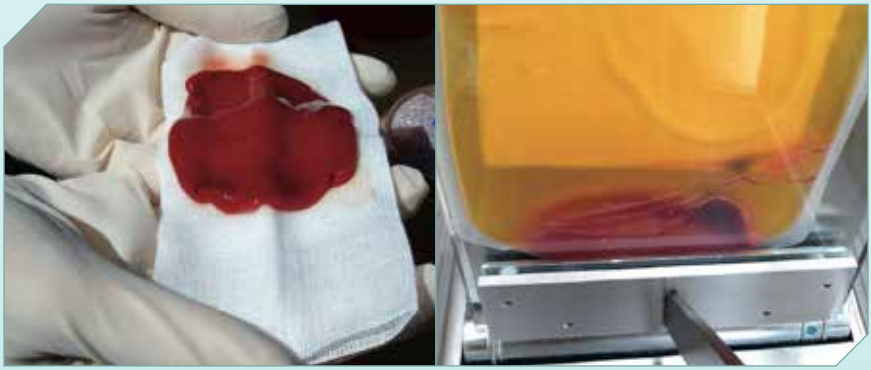
W W W . P R I M U S G E L . C O M

COMPANY

Since its foundation in 2006, **PRIMUS GEL S.R.L.** has endeavored to improve the lives of animals, mainly horses and pets, through the use of Regenerative Medicine. We are one of the first companies to have pioneered the use of regenerative stem cells and PRP in veterinary medicine and have successfully treated many cases of tendon and ligament injuries, skin and soft tissue injuries, as well as accelerated healing of bone fractures and bone regeneration.

The management team consists of nationally recognized specialists: dr. Marco Scala, Regenerative Surgery specialist; dr. Raffaello Colalillo, Transfusion Medicine specialist and dr. Silvia Lenarduzzi, Regenerative Equine Medicine specialist.

We have teamed up with Biorigen s.r.l., our sister company, devoted to R&D in the field of Regenerative Medicine. Biorigen is studying stem cells and platelet growth factors, which are the building block of Regenerative Medicine, since 1996, thus offering a solid expertise and the best and most advanced regenerative technology available. This is the reason why we use our own patented procedure in our own treatements (patent PCT WO 2008/004260 RM2006A000289, 31st May 2006, Cancedda, Mastrogiacomo, Scala).

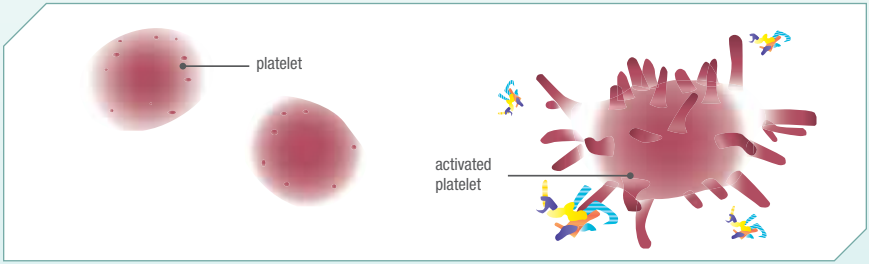


THE HIDDEN HEALING POWER OF PLATELETS

Recent evidence emphasizes the importance of blood platelets role in the repair and regeneration of connective tissues, tendon and ligament injuries and bone fractures healing.

Blood platelets, when activated, release their storage pool of powerful growth factors (GFs), which stimulate the proliferation and differentiation of local stem cells. Growth factors stimulate also a chemotactic migration towards macrophages, monocytes, polymorphonuclear leukocytes and peripheral stem cells.

The goal of regenerative medicine is to bring injured tissues, such as tendon, ligament, cartilage and bone, back to its original pristine condition by local and controlled release of growth factors into the surgical or wounded site.

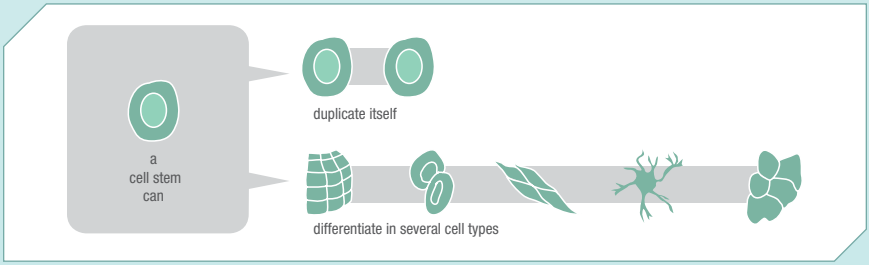


STEM CELLS: A MAGICAL REALITY

Stem cells are undifferentiated cells that can differentiate into several specialized cells. They are a biological repair-system since theoretically they can replicate ad libitum in order to replace damaged cells.

When stem cells divide can take on two fates, each newborn cell can duplicate itself into a perfect replica of the original stem cell or, under physiological needs or specific induced conditions, can became a differentiated and specialized cell, such as muscular cells, blood cells or brain cells.

Stem cells are found in various adult tissues, such as bone marrow and adipose tissue and act as a natural repair system for the body, maintaining the normal turnover of regenerative organs, such as blood, skin or intestinal tissues as well as restoring damaged tissues. These cells are called pluripotent cells which means that they have the potential of evolving into specific cells.



The ability to replicate and differentiate makes the stem cells the perfect source for the regenerative medicine.

Autologous adipose-derived mesenchymal stem cells (AD-MSC) are used in Veterinary Regenerative Medicine in the treatment of canine osteoarthritis (caused by hip dysplasia or congenital abnormalities) and equine soft tissue injuries (tendons and ligaments).

WHY PRIMUS GEL

Equine Veterinary Regenerative Medicine offers a safe and successful treatment to the most common injuries of athletic horses: tendon and ligament injuries.

Until recently, many different methods were used to treat injured tendons and ligaments, but all of them were not satisfactory or mere palliative. Moreover side effects ranged from scarring of the tendons, tendon elasticity alteration as well as mechanical properties alteration.

Stem cell therapy combined with growth factors show excellent results with repair and regeneration of connective tissue, mainly because and thanks to the ability of boosting the production of type I collagen compared to type III collagen, which is less functional for tendons and ligaments regeneration. The goal of this approach is to recreate real tendon tissue instead of scar tissue.

QUALITY FIRST

PRIMUS GEL takes the quality issue very seriously, this is why all the machines we use have been thoroughly tested for platelet concentration.

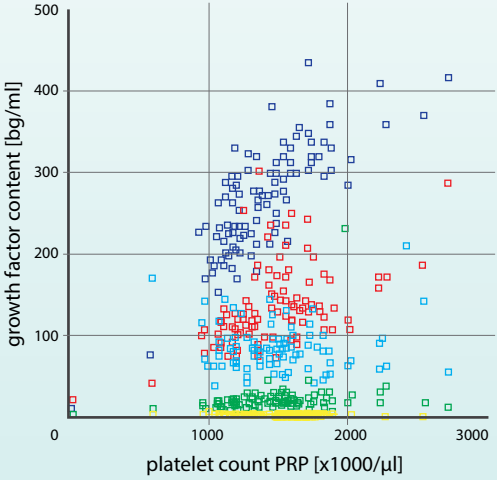
The scatter plot below shows the thrombocyte count and PDGF–AB, PDGF–BB, TGF–β1, TGF– β2, and IGF– 1 levels in PRP samples.

OPTIMAL PLATELET CONCENTRATION

2.5 – 4.5 x 106/µL (SIMTI GUIDELINES , 2000)

1 x 106/µL (MARX RE, J ORAL MAXILLOFAC SURG, 2004)

1.2 – 2.0 x 106/µL (BORZINI P, *TRANSF MEDICINE*, 2006)



LEGEND

- TGF-β1
- PDGF-AB
- IGF-1
- PDGF-BB
- TGF-β2

PRP TREATMENT ADVANTAGES

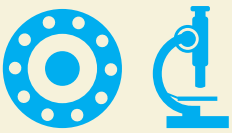
safe	PRP is prepared from the patient's own blood, which means no concerns with rejection or complications.
effective	PRP delivers superior and long lasting effects quickly.
natural	PRP can be considered a natural cure, no drugs are used, and unpleasant side effects are avoided.
convenient	PRP treatments are quick and non invasive, this is the reason why they are cheaper.

HOW IT WORKS • PRODUCTION AND THERAPY

PRIMUS GEL PROTOCOL

WHOLE BLOOD
IS DRAWN FROM PATIENT

For a horse is usually
drawn 450 ml of whole blood
into a blood sac.

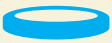


LABORATORY PROCESS

Blood is processed according to
Primus Gel patented production protocol
in order to obtain Platelet Rich Plasma and
Platelet Gel as a therapeutic
means of treatment.

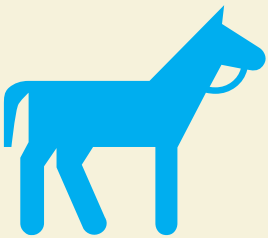
PRP

CAN BE FROZEN FOR STORAGE
(PLATELET LYSATE)



CAN BE USED TO MAKE
PLATELET GEL IN A PETRI DISH

PRP OR PLATELET LYSATE
IS INJECTED INTO
INJURED PARTS



PLATELET GEL
IS ALLPLIED AS PATCH
OVER WOUNDS

PRP

used for the treatment
of a variety of soft tissue
tendon and ligament injuries
and osteoarthritis.

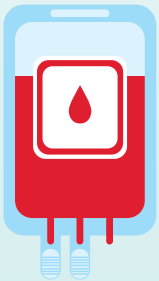
PLATELET GEL

used for the treatment
of difficult-to-heal wounds
and skin ulcer or to speed
wound healings.

■ ADVANCED PRODUCTION PROTOCOL

Platelet-rich plasma refers to a sample of serum (blood) plasma that has as much as nine times more than the normal amount of platelets. A four to five times concentration of the average patients platelet count (200,000/mm3) appears to be the desired level for a successful therapeutic usage.

Commercial PRP preparation systems, albeit popular, are not a guarantee of good therapeutic results. There are many variables that concur to obtain the optimal platelet concentration level. These procedural differences can and will affect both immediate results as well as long-lasting benefits of the PRP treatment. This is the reason why **PRIMUS GEL** established its own PRP production protocol.



COMMERCIAL PREPARATION

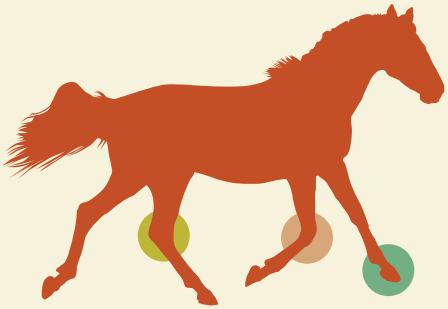
- » Non-standard preparation protocol.
- » No guarantee of platelets concentration.
- » Lack of quality control.
- » Bacterial contamination of platelet products.

PRIMUS GEL PROTOCOL

- » PRP obtained from fractioning whole blood (450ml) drawn in bag.
- » At least 1 million platelets per µL. guaranteed for best treatment.
- » Quality control over all our procedures.
- » Use of laminar flow cabinet for sterile processing.

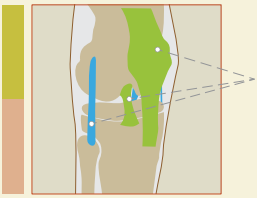
PRP THERAPY, 100 CASES STUDY

TENDON and LIGAMENT INJURIES in HORSES

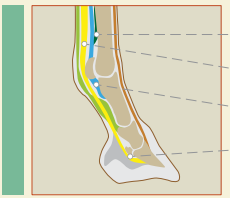


PRP

NATURAL HEALING POWER



6 articular ligaments



5 accessory ligament of the deep digital flexor

45 superficial digital flexor tendon

35 fetlock suspensory ligament

8 deep digital flexor tendon

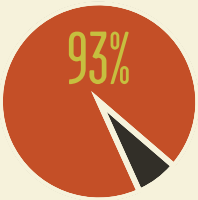
REGENERATIVE MEDICINE

TREATS THE DAMAGED TISSUE REGENERATING IT ANEW

PRP
Platelet Rich Plasma

Peripheral horse's blood is drawn in a blood sac, concentrated with the Primus Gel protocol and re-injected allowing the regeneration process

Success Rate in a 100 horses cases study[1]



93% therapeutic success with with full recovery

7% partial or no success

[1] SOURCE: REGENERATIVE MEDICINE FOR THE TREATMENT OF TENO-DESMIC INJURIES OF THE EQUINE, M. SCALA ET AL., SEE APPENDIX

RESEARCH

Our medical team is relentless in being involved in developing and studying new ways to apply Regenerative Medicine in order to improve the lives of humans and as well for animals now. Their articles and case studies are always well documented and published internationally.

PICTURES FROM A THERAPEUTIC SUCCESS

A significant improvement of a Priums Gel PRP treatment can be seen in these US-scan images, which show an injured digital flexor tendon lesion [Fig. 1] and its rapid recovery [Fig. 2, 3] every month culminating in the full recovery after 3 months [Fig. 3].

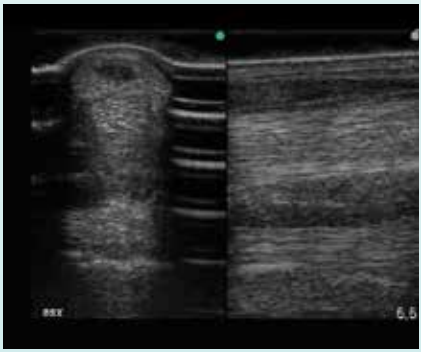


Fig 1. US-scan shows a superficial digital flexor tendon lesion.

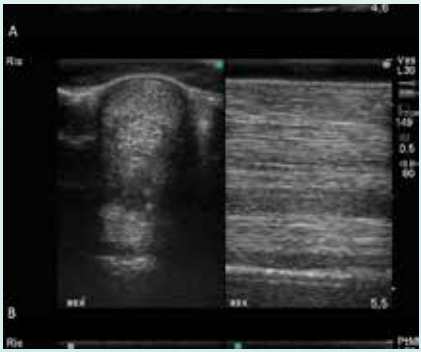


Fig 2. US-scan after 1 month.

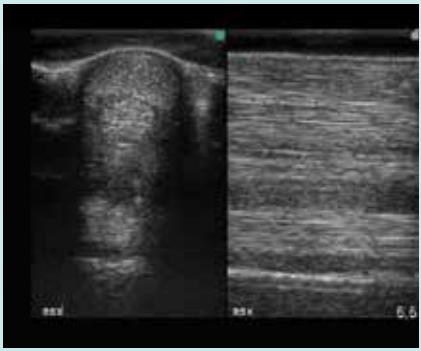


Fig 3. US-scan after 2 months.

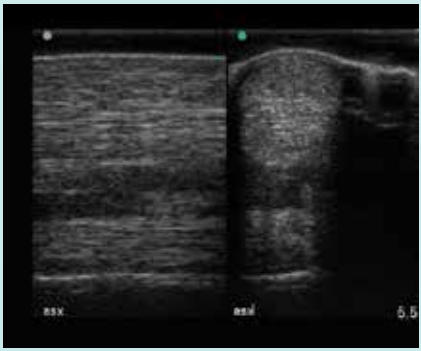


Fig 4. US-scan after 3 months.

Regenerative Medicine for the Treatment of Teno-Desmic Injuries of the Equine

A series of 150 horses treated with platelet-derived growth factors.

Marco Scala, Silvia Lenarduzzi, Anita Muraglia, Chiara Ottonello, Francesco Spagnolo, Paolo Strada.

Abstract

The aim of this study was to evaluate the safety and the clinical outcome of platelet rich plasma for the treatment of teno-desmic injures in competition horses.

From January 2009 to December 2011 150 sport horses suffering from teno-desmic injuries were treated with not gelled platelet-concentrate. No horse had any major adverse reaction as a result of the procedure. Full healing was obtained for 81% of the horses included in the clinical outcome analysis (N=99); 12% had clinical improvement and only 7% a failure. 8% cases of relapse were observed. No statistically significant correlation existed between the clinical outcome and the area of the lesion. A statistically significant correlation existed between the clinical outcome and the age of the horse.

Cell therapy and tissue engineering in equine veterinary arises from the need to find an optimal therapeutic solution to heal difficult injuries of tendons and ligaments in horses. These lesions have a poor regenerative capacity and often relapse, definitely affecting the athletic activity of the horse. Conventional therapies are not optimal because they cause the formation of a tendon scar and an alteration of the elasticity and mechanical properties of the structure, leading to a delayed healing that does not permit the resumption of agonistic activity. Treatment with platelet-derived growth factors, on the contrary, lead to the formation of a tendon with normal morphology and functionality, which translate in the resumption of the agonistic activity for the majority of the horses we treated.

Introduction.

In veterinary as well as human medicine tenodesmic lesions play a great interest because of their high incidence, the difficult wound healing and therefore an incomplete full functional recover with long periods of inactivity.

The specific pathogenesis of these diseases includes continuous microtrauma, forced exercise, high speed, muscle fatigue; they may also be manifestations of a degenerative process in old horses [1].

The connective tissue lesions are characterized by destruction and disorganization of collagen fibers; this process results in the formation of inelastic scar tissue, unable to adapt to the continuous tension changing of the structure [2].

In sport horses, tendon and ligament injuries are a frequent cause of lameness and entail long periods of rest. Conventional therapies, as the thermo-cautery, extracorporeal shock waves, hyaluronic acid and surgical techniques (radial bridle desmotomy, tendon splitting, carbon fibers implant) do not act on the pathogenesis, lead to an often delayed healing that does not permit the resumption of normal agonistic activity and, in some cases, severe recurrences happen.

Recently, regenerative medicine and tissue engineering have focused on the use of

growth factors (GFs) and cell-based therapy to improve the quality and speed of healing in tendons and ligaments [3].

Regenerative medicine aims to restore the normal structure and the biomechanical properties of the injured tissue and is based on the employment of either stem cells with multipotent differentiating potential and/or biological products (Platelet Rich Plasma, PRP, or its gel formulation Platelet Gel, PG) that have the ability to induce the recruitment, proliferation and differentiation of cells involved in the tissue regeneration.

Tissue repair is a complex biological process facilitated by growth factors (GF), molecules of crucial importance that interplay and exchange biochemical information. GFs are produced by the cells involved in the regenerative process and when they reach a proper concentration they trigger the reparation process. [4]

During soft or hard tissue healing, blood platelets are the main source of released GF necessary for the process. In addition to their functions in hemostasis, platelet α-granules release growth factors (PDGF, TGF, EGF, IGF, FGF, VEGF) which promote tissue regeneration [5]. These proteins regulate various processes involved in wound healing and tissue regeneration by regulating cell proliferation and differentiation, angiogenesis, matrix deposition and tissue remodeling [6].

Several in vitro studies have been performed with platelet derived growth factors. PRP treatment improved the gene expression of type I and type III collagen and of COMP (cartilage oligomeric matrix protein) when used on SDFT equine tendon explants [7]. Also platelet lysate, a PRP derivative, has been shown to have a positive effect on the proliferation of equine mesenchymal stem cells and tenocytes [8]. The promising results obtained by in vitro studies have encoauraged the in vivo PRP use as treatment for the management of tendon injury in sport horses [9,10] or in surgically created tendon lesions [11-13]. The available data about the therapeutic use of PRP in equine tendon and ligament lesions are promising but show some limits due for example to the lack of a standardized procedure for the PRP preparation, the variability in the number of platelets of the platelet concentrate and the number of PRP treatments.

The aim of this study was to evaluate the safety of the procedure and the clinical outcome (i.e. the rate of horses that could resume their normal agonistic activity) in competition horse affected by teno-desmic injures treated with platelet rich plasma obtained with a standardized procedure.

Study design

From January 2009 to December 2011 150 sport horses suffering from teno-desmic injuries were treated with not gelled platelet-concentrate. Only 99 horses have an adequate follow-up (at least 12 months), thus our analysis will be limited to these animals. The basin of origin of the animals was Northern Italy, from Brescia to Pisa and the races were well represented. The horses were treated in four different veterinary facilities.

Baseline Assessments

All injured horses underwent clinical evaluation to define the lesion by inspection and palpation in order to assess tenderness and heat. Heat was also evaluated by digital camera thermography. The presence of lameness at the walk and trot was evaluated. Lameness grade was > or equal to 2 for all horses.

During the physical examination, the involvement of the bone, such as fractures, should be excluded; a radiographic examination was performed if clinically indicated. The location and severity of the damage to the tendon was defined by transverse and longitudinal ultrasound scan. A US-scan was performed at baseline and 3, 6 and 9 weeks after treatment.

PRP preparation

Two units of 450 ml of blood are collected from the horse through a standard triple bag system. The first bag (bag 1) contains the CPD anticoagulant (citrate-phosphate-dextrose).

Of the two satellite bags, bag 2 contains SAGM (preservative solution for red blood cells, consisting of saline, adenine, glucose and mannitol), while the other (bag 3) is empty.

The method of sampling in the horse is quite simple, due to the easy availability of the sampling site and the size of the animal, that allows easily the removal of 450-900 cc of blood. Sampling was done from the jugular vein after trichotomy and disinfection of the area. The operator always used sterile gloves. Sterility is very important because this is the only time for possible contamination of the sample.

The blood was drained by gravity into the first bag (bag 1). Once filled, the infusion tube must be closed and the needle used for sampling is removed. The blood is sent to the laboratory at room temperature (20-24°C) and platelets should be separated within 6 hours after blood collection.

All centrifugation steps were performed in the centrifuge Rotanta 460 R (Hettich Zentrifugen).

Blood is centrifuged at 1450 rpm for 10 minutes at 20°C, in order to obtain the separation of red blood cells from plasma, which contains platelets and the factors that lead to the formation of a clot. Plasma separation is obtained thanks to a mechanical plasma extractor after locking in a suitable way the bag containing SAGM (bag 2). Plasma is collected into the empty bag (bag 3).

After blocking the entry of liquid into bag 3, containing the plasma, the SAGM solution is made to flow into the bag containing the red blood cells (bag 1), which is then eliminated. Plasma (bag 3) is then centrifuged at 3000 rpm for 20 minutes at 20°C, thus obtaining the separation of a platelet pellet and platelet poor plasma (PPP). The PPP is collected into the bag that previously contained the SAGM solution (bag 2).

The bag containing the platelet pellet (bag 3) is weighed. The platelets are then resuspended in 30-35 ml of PPP in order to have a PRP with a platelet concentration of about 1 x 106 platelets / µl. The bag containing the PRP is placed on a platelet agitator under constant agitation at room temperature in order to obtain a homogeneous platelet suspension; after about 2 hours the bag is transferred under a sterile hood and the platelet concentrate is dispensed into sterile tubes (Monovette, Sarstedt). The PRP product is stored at -20 °C until use. Platelet count is performed on a small aliquot of PRP in order to assess the quality of the product, after having diluted 1:5 the sample with saline solution.

PRP treatment

The laboratory provides the physician with the PRP in the frozen form, contained in sterile tubes; one part of the product is used immediately, other tubes are stored at -20°C for possible future applications.

The horse is prepared for surgery proceeding to sedation. The degree of sedation depends on the horse and is preferably performed with acepromazine (0.03-0.08 mg / kg) and xylazine (0.003 to 0.005 mg / kg). Disinfection is performed by a massage with alcohol, put in place for about 7 minutes, and completed with the application of a disinfectant like Betadine iodine solution. The intralesional injection of PRP is performed by ultrasound-driven syringe needle (22G or 23G) at the exact point of injury. The amount of injected PRP product varies depending on the size of the lesion. The PRP may also be applied under the skin above and around the injured tendon or ligament. In case of injury to the palmar tenodesmic structures of the metacarpus or plantar tenodesmic structures of the metatarsus, the PRP is injected under the skin via a 25 G butterfly needle in the proximal metacarpal/metatarsal region, and it is then scrolled down with massage. In some cases, such as minor injuries to the superficial digital flexor, as it is very difficult to insert the needle into the lesion, it may be sufficient to place the PRP in the subcutaneous tissue. After the procedure, the skin is disinfected and dressed with cotton gauze and a Vetrap-type bandage strip. The dressing remains in situ for 48 hours.

All animals were treated with not gelled platelet-concentrate. However, the four veterinary facilities applied four slightly different clinical protocols:

1. Intralesional and perilesional injection with the platelet concentrate ;
2. Intralesional injection with platelet concentrate, followed by two perilesional injection after 15 and 30 days;
3. Intralesional injection with platelet concentrate, followed by another intralesional injection after 30 days;
4. Intralesional injection with platelet concentrate at Day 1, followed by:

- Day 7: Shock waves therapy
- Days 10, 11 and 12: Tecartherapy
- Day 14: Shock waves therapy
- Days 17, 18 and 19: Tecartherapy
- Day 21: Shock waves therapy
- Days 23, 24 and 25: Tecartherapy

Almost half horses (48%) were treated according to protocol 2; 23% and 20% of them were treated according to protocol 1 and 4, respectively, and only 9% to protocol 3.

Rehabilitation program

After 48 hours the horse is sent to the rehabilitative phase. The rehabilitative treatment included:

1st Week:

- Rest in stalls
- Robert Jones bandage for 3 days
- In-hand stepping on hard ground for 20 minutes a day

2nd-3rd Week:

- Rest bands in stalls
- In-hand stepping for 10-20 minutes and mounted stepping for 10-20 minutes a day on hard ground

3rd to 6th Week:

- Mounted stepping for 20 minutes a day and trotting for 5-10 minutes a day

6th to 12th Week:

- Trotting for 15 minutes a day

After 3 months:

- 50 minutes a day of work including canter/gallop

All horses were followed-up by clinical examinations and US-scans.

Statistical analysis

All analyses were performed using the survival package of the open source statistical software R. (R Development Core Team (2008). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org.)

The statistical analysis of the data was performed using ANOVA and Chi-square tests.

ANOVA evaluates the effects of two or more independent variables simultaneously on a single dependent variable.

Chi-square tests are designed to determine that an observed number differs from chance or from what was expected.

Safety

None of the treated animals had any major adverse reactions as a result of the procedure, either locally or systemically. The rehabilitation program was well tolerated.

Results

99 horses were included in the analysis of clinical activity, while all horses were evaluated for the safety of the procedure. The basin of origin of the animals was Northern Italy and the races were well represented. 9.3 years was the average age of the horses (range 2-23 years).

The lesions included in the analysis were distributed as follows:

- 45 superficial digital flexor tendon;
- 8 deep digital flexor tendon;
- 6 articular ligaments;
- 5 accessory ligament of the deep digital flexor;
- 35 fetlock suspensory ligament.

None of the treated animals had any major adverse reactions as a result of the procedure, either locally or systemically. The rehabilitation program was well tolerated.

The grade of therapy success was evaluated as follows:

- Grade 1 (failure): a complete clinical and ultrasound healing is not obtained;
- Grade 2 (improvement): a complete

clinical and ultrasound healing is obtained but the horse resumes his agonistic activity at an inferior level;

- Grade 3 (success): a complete clinical and ultrasound healing is obtained and the horse resumes the same agonistic activity he had before the injure within maximum 6 months.

A grade 3 success was obtained for 81% of the horses included in the analysis; 12% had an improvement (grade 2) and only 7% a failure (grade 1).

8 (8%) cases of relapse were observed; three of them, however, obtained a grade 3 success after a second treatment.

No statistically significant correlation existed between the clinical outcome and the area of the lesion (ANOVA, p=0.05) or the kind of protocol applied (Chi-squared, p=0.05). A statistically significant correlation existed between the clinical outcome and the age of the horse (ANOVA, p=0,05).

Discussion

Cell therapy and tissue engineering in equine veterinary arises from the need to find an optimal therapeutic solution to heal difficult injuries of tendons and ligaments in horses. These lesions have a poor regenerative capacity and often relapse, definitely affecting the athletic activity of the horse. Conventional therapies are not optimal because they cause the formation of a tendon scar, an alteration of the elasticity and mechanical properties of the structure, leading to an often delayed healing (1-2 years) that does not permit the resumption of normal agonistic activity [14].

In the scars the collagen is less cross-linked compared to normal tendon collagen and the predominant form is the type III (<1% in normal tendon compared to 20-30% in the scar tissue) [15]. Furthermore, the mechanical properties of the scared tendon are worse than the normal tendon due to a deficient structural organization and composition of the extracellular matrix [16]. On the contrary, regenerative medicine aims to favor the healing of the tissue recovering its original functional properties [3]. On the basis of previous studies, cell therapy and the use of growth factors have proved to succeed in connective tissue regeneration, mainly due to the ability to stimulate the formation of type I collagen in a greater quantity than type III collagen, which is significantly less functional for tendon and ligament biomechanics.

In the present study we evaluated the effect of PRP treatment on teno-desmic injuries in competition horses with different clinical protocols.

The success rate of our therapy with platelet concentrate was 93% regardless of the variant of protocol, higher than that observed with traditional treatments, while the relapse rate turned out to be much lower [17, 18]. In addition, also cases of relapse were successfully treated.

Regenerative medicine using growth factors is able, by itself, to lead to the healing of the lesions, without the need of any additional treatments.

Through the influence on the proliferation of fibroblasts, the promotion of angiogenesis and development of structures vascular mature, in fact, such treatment is not only capable of repairing the lesion with regenerated structure rather than a fibrotic scar, but also to strengthen the entire tendon structure decreasing the risk of recurrence and onset of new lesions. No statistical significance between the four different treatments and clinical outcome was observed, so some considerations can be made. Protocol 4 is not to be considered the variant of choice, because it is more expensive and include additional treatments which are probably not necessary. Protocol 2 was the most used one, but requires three injections at three different times. Protocol 1 is the most simple with only intra- and perilesional injections in a unique time. Therefore, the protocol of choice may be variant 2, since more data on safety and efficacy are available, or 1, since it is the least expensive and no statistically differences in efficacy were observed with other variants.

There was no statistically significant correlation between the area of the lesion and the response to treatment and this can be explained by the fact that the effectiveness of the treatment extends beyond the difficulty of healing of a particular lesions arising in a "critical" area, such as the core lesions of the superficial digital flexor tendon.

The efficacy of the treatment occurred even in those cases of complete tearing of the tendon.

The limitations of our study were the lack of a control animal group and of histological evaluation. Even if with some limitations, the clinical observations derived from our study suggest that PRP treatment may be a promising therapy in treating teno-desmic injures which have a poor healing potential if treated with standard approaches. Full healing was obtained for 81% of the horses included in our analysis, 12% had clinical improvement and only 7% a failure. Future randomised controlled studies are needed to confirm our results.

References

1. Kim JS, Hinchcliff KW, Yamaguchi M, Beard LA, Markert CD, Devor ST. Exercise training increases oxidative capacity and attenuates exercise-induced ultrastructural damage in skeletal muscle of aged horses. J Appl Physiol. 2005 Jan;98(1):334-42.
2. Teitz CC, Garrett WE Jr, Miniaci A, Lee MH, Mann RA. Tendon problems in athletic individuals. Instr Course Lect. 1997;46:569-82.
3. Koch TG, Berg LC, Betts DH. Current and future regenerative medicine - principles, concepts, and therapeutic use of stem cell therapy and tissue engineering in equine medicine. Can Vet J. 2009 Feb;50(2):155-65.
4. Jurk H, Kehrel BE. Platelets: physiology and biochemistry. Semin Thromb Homost. 2005;31:381-92.
5. Harrison P, Cramer EM: Platelet alpha-granules. Blood Rev 7: 52-62, 1993.
6. Stammers AH, Trowbridge CC, Marko M, Woods EL, Brindisi N, Pezzuto J, Klayman M, Fleming S, Petzold J: Autologous platelet gel: fad or savoir? Do we really know? J Extra Corpor Technol 41: 25-30, 2009.
7. Schnabel LV, Mohammed HO, Miller BJ, McDermott WG, Jacobson MS, Santangelo KS, Fortier LA. Platelet rich plasma (PRP) enhances anabolic gene expression patterns in flexor digitorum superficialis tendons. J Orthop Res. 2007 Feb;25(2):230-40.
8. Del Bue M, Riccò S, Conti V, Merli E, Ramoni R, Grolli S. Platelet lysate promotes in vitro proliferation of equine mesenchymal stem cells and tenocytes. Vet Res Commun. 2007 Aug;31 Suppl 1:289-92.
9. Argüelles D, Carmona JU, Climent F, Muñoz E, Prades M. Autologous platelet concentrates as a treatment for musculoskeletal lesions in five horses. Vet Rec. 2008 Feb 16;162(7):208-11.
10. Waselau M, Sutter WW, Genovese RL, Bertone AL. Intralesional injection of platelet-rich plasma followed by controlled exercise for treatment of midbody suspensory ligament desmitis in Standardbred racehorses. J Am Vet Med Assoc. 2008 May 15;232(10):1515-20.
11. Bosch G, Moleman M, Barneveld A, van Weeren PR, van Schie HT. The effect of platelet-rich plasma on the neovascularization of surgically created equine superficial digital flexor tendon lesions. Scand J Med Sci Sports. 2011 Aug;21(4):554-61.
12. Bosch G, René van Weeren P, Barneveld A, van Schie HT. Computerised analysis of standardised ultrasonographic images to monitor the repair of surgically created core lesions in equine superficial digital flexor tendons following treatment with intratendinous platelet rich plasma or placebo. Vet J. 2011 Jan;187(1):92-8.
13. Bosch G, van Schie HT, de Groot MW, Cadby JA, van de Lest CH, Barneveld A, van Weeren PR. Effects of platelet-rich plasma on the quality of repair of mechanically induced core lesions in equine superficial digital flexor tendons: A placebo-controlled experimental study. J Orthop Res. 2010 Feb;28(2):211-7.
13. Goodship AE, Birch HL, Wilson AM. The pathobiology and repair of tendon and ligament injury. Vet Clin North Am Equine Pract. 1994 Aug;10(2):323-49.
14. Williams IF, Heaton A, McCullagh KG. Cell morphology and collagen types in equine tendon scar. Res Vet Sci. 1980 May;28(3):302-10.
15. Wang JH. Mechanobiology of tendon. J Biomech. 2006;39(9):1563-82.
16. Dowling BA, Dart AJ, Hodgson DR, Smith RK. Superficial digital flexor tendonitis in the horse. Equine Vet J. 2000 Sep;32(5):369-78.
17. Buchner HH, Schildboeck U. Physiotherapy applied to the horse: a review. Equine Vet J. 2006 Nov;38(6):574-80.

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