FAQ: E-PET Equine Platelet Enhancement Therapy

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Platelets

What are platelets?

Platelets are a cell-like component of blood and are primarily responsible for the development of clots. Platelets also contain a remarkable array of growth factors involved in healing. The list includes platelet-derived growth factors (PDGF), ß-thromboglobulin, fibroblast growth factor, insulin-like growth factor 1, epidermal growth factor, and vascular endothelial growth factor. These growth factors are primarily responsible for the recruitment and differentiation of progenitor cells; promoting angiogenesis, new tissue growth, and replenishing the extracellular matrix.

Top

How long has platelet therapy been around?

Platelet therapy has been used since the early 1970's in periodontics for the treatment of severe gingivitis and in maxillofacial surgery to build bone mass in the jaw in preparation for dental implants. Since then, the use of platelets from a patient's own blood has been employed in the treatment of tendon and ligament damage, popularized recently by televised reports of its use in professional athletes.

Top

Are there any other names for platelet therapy?

The most common name for platelet therapy is 'platelet rich plasma', or PRP.

It's worth noting that the term 'PRP' has two uses in the medical literature. Traditionally, PRP is used by the blood banking industry to describe a whole blood product that has been processed into platelets and plasma and destined for transfusion. Platelets in this product are only concentrated to levels about twice that found in circulating whole blood. This is not the 'PRP' used in platelet therapy.

The 'PRP' used as a platelet therapy in dentistry, orthopedics and sports medicine, etc, is a product that concentrates platelets 3 to 8+ times above the levels found in whole blood. These products are produced by centrifugation or, as is the case with E-PET, by filtration, and can include white and red blood cells along with the platelets and plasma. Many of the fields that use platelet therapy have started to use terms other than 'PRP', and some of the evolving terms include 'platelet concentrate', 'platelet preparation', and concentrated platelet product (CPP).

Top

What is in a platelet therapy?

Most platelet therapies are milieus of cells, cell-parts, and plasma constituents. While there is no agreement on what the best product composition is for any given indication, the one thing all platelet therapies have in common is the concentration of platelets.

Platelets: Current evidence suggests that platelet concentrations at least 3 times above naturally occurring levels provide effective treatments. There is some evidence to suggest that extreme concentrations, roughly 10x or more, may be less effective in some applications. It is important to note that preparations with equal platelet concentrations can differ in the amount of growth factors they deliver depending on the activation status of the platelets. E-PET produces a 7x non-activated platelet preparation.

White blood cells (WBCs): Some platelet preparations contain WBCs, and those that do sometimes concentrate WBCs to levels higher than that found in circulating whole blood. There is a growing body of evidence that platelet gels reduce the risk of post-operative infections, particularly in thoracic surgery[1], and it is possible the WBC's in these preparations contribute to the response. Others argue that WBCs could be detrimental, releasing cytokines that could exacerbate inflammation. However, WBCs are also the primary source of interleuken-1 receptor antagonist protein[2], a potent anti-inflammatory, and the protein used in IRAP™ therapy. E-PET produces a preparation with approximately a 3x concentration of WBCs.

Red blood cells (RBCs): Very few, if any, platelet preparations actually concentrate RBCs, but many preparations contain them. Most clinicians are not bothered by the presence of RBCs, but some prefer that they are removed, believing that RBCs can contribute to pain at the site of injection. Sporadic reports of pain at the site of injection using preparations that do not contain RBCs suggest the incidents may be related to the citrated anti-coagulant, an agent with a low, but well documented, incidence of causing pain in blood draws and injections. On the flip side of the RBC discussion, some have argued that the ADP in RBCs may help mediate a sustained release of platelet growth factors at the site of injection. E-PET produces a preparation with an approximately 15% hematocrit.

Optional agonists to assist in fibrin-clot formation: Most platelet preparations can be modified to include fibrin-clots, but the decision to do so is application specific. For instance in bone reconstruction, surgeons prefer platelet preparations that are thick enough to mold into the treatment site and stay there. Some platelet therapies offer proprietary agonists for these applications that add to the structure of the preparation, such as modified bone chips or calcium matrices. For obvious reasons, these structural modifications are not recommended for intra-articular, -tendon, or -ligament injections. The E-PET kit does not include an optional fibrin-clot forming agonist, nor has it been characterized for fibrin-clot forming applications.

Top

What is the difference between E-PET and other types of platelet therapy?

Simplicty: With E-PET there are no power requirements, no centrifuges, and no service contracts. The system is small, portable, quick, and easy to use.

Filter based preparation: Standard methods of preparing platelet therapy require centrifuges that expose platelets to forces several thousand times the force of gravity. In some products, these forces can cause the premature release of platelet growth factors before they can be administered as a therapy. Pall's E-PET is the only platelet therapy method that uses filtration technology to gently capture and recover platelets. Our studies have shown that this process is so innocuous that the platelets prepared by E-PET are no more activated than the levels naturally found in circulating blood.

Top

Risk

What are the risks?

Over 2,500 horses have been treated with E-PET to date without a single untoward incident related to administering the platelet therapy.

Top

Expectations of Outcome

What results can I expect with the treatment?

A study of E-PET was reported on by Roger Smith, DVM of the Royal College of Veterinary Medicine, at the Dec 6, 2008 American Association of Equine Practitioners annual meeting in San Diego, CA. Dr. Smith conveyed the results of a trial of 14 cases of suspensory ligament desmitis with lesions affecting an average 28% of their total cross-sectional areas as determined by ultrasonography. The average time for lameness score to reduce to 0/10 (not lame) was 5 weeks. Ultrasonographic mean score on presentation was 2.9 (range 2.5 -3) and the average score at the three month evaluation was 1.25.

In addition, a case report of E-PET platelet therapy for suspensory ligament repair showed the treatment to be safe, and apparently efficacious in effecting improvement at 8 weeks post-treatment[3]. Improvement in this animal, who failed to respond to standard therapy, was judged by comparing the size of the hypoechoic region measured with ultrasound before and after platelet therapy. For the ultrasonographic images see our product performance page.

Top

Treatment

What should I look for in a tendon or ligament injury to treat with E-PET?

Injuries should present clinical lameness with ultrasonographic pathology, such focal lesions or, more commonly, enlargement and generalized hypoechogenicity.

Top

What's the procedure?

Blood is drawn, filtered and recovered by reverse flow using a proprietary elution solution. The patient is restrained and sedated; the affected area and local anesthetic site are clipped and aseptically prepped. To ensure complete desensitization, a four-point never block is performed. Using ultra-sound guidance, a needle is inserted in the core lesion of the affected tendon or ligament. The syringe containing the platelet therapy is attached and administered until the clinician feels resistance. The volume administered can range from 1 to 8 mL depending upon the horse and the nature of the injury.

Top

What size needle should I use?

A 23 gauge needle is often used, but can vary depending on the application and veterinarian's preference.

Top

How long does it take?

The entire procedure typically takes 30 to 40 minutes. The component parts include sedation (5 minutes), blood draw (5 minutes), filtration and platelet recovery (15 minutes), nerve block (during filtration), and the platelet therapy injection (5 minutes).

Top

Follow up

Is there a specific post treatment regimen?

The limb is bandaged (Robert Jones) and the horse box-rested for 3 to 4 days. During this time, most veterinarians provide routine antibiotics. The patient then enters an ascending rehabilitation program, gradually increasing in exercise while closely monitoring progress with ultrasonographic examination.

Top

More Questions?

Contract Pall Animal Health's veterinary help line - 516-462-3991

Top

[1]Khalafi, R., et al. Topical application of autologous blood products during surgical closure following coronary artery bypass graft. European Journal of Cardio-thoracic Surgery, 34 (2008) 360-364.

[2]Arend WP.Interleukin-1 receptor antagonist. Adv Immunol. 1993;54:167-227. PMID: 9597123

[3]Mountford DR, Schaffer J. The treatment of suspensory ligament desmitis. *Equine Compendium* March 17, 2008; 3-5.

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