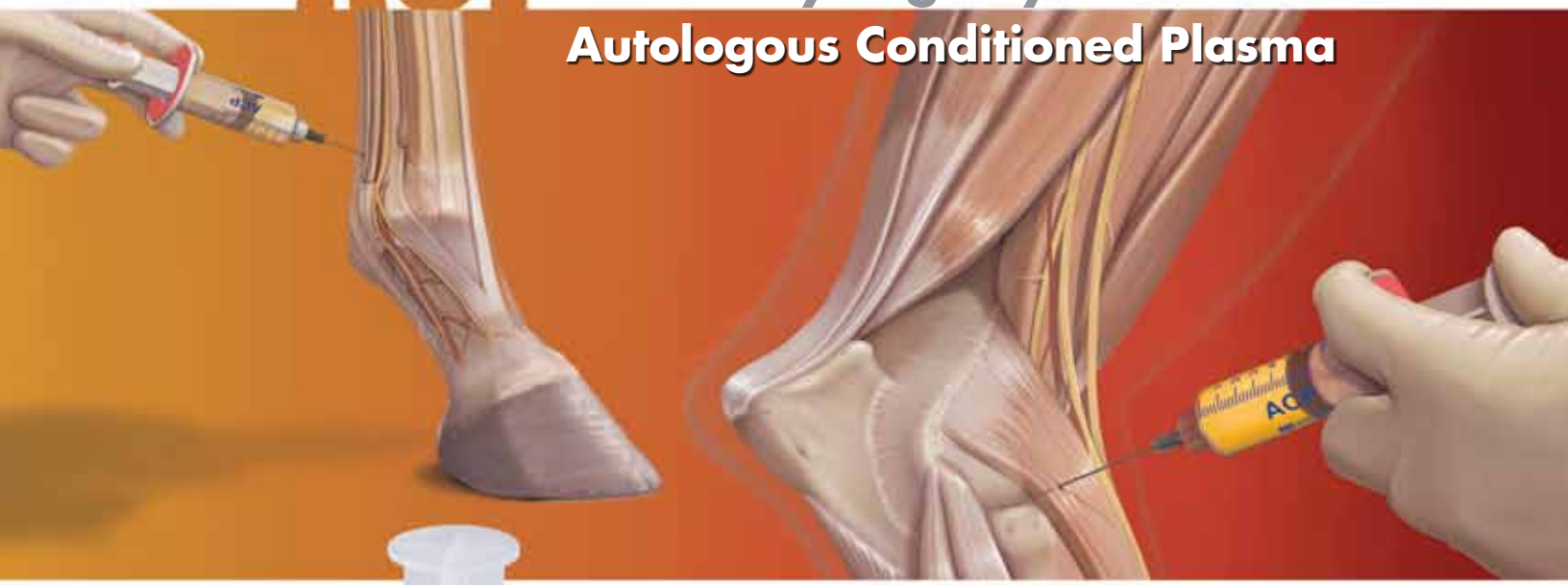
ACP Double Syringe System

Autologous Conditioned Plasma



For the safe and rapid preparation of platelet-rich plasma

Arthrex® Vet Systems

Arthrex ACP®

Introduction

Autologous blood products have created a growing interest for use in a number of therapies. The healing effects of plasma are supported by growth factors released by platelets. These growth factors induce a healing process wherever they are applied.

Rotor Set with Buckets

Features and Benefits:

- The ACP (Autologous Conditioned Plasma) System allows for rapid and efficient concentration of platelets and growth factors from autologous blood, for use at the treatment site
- The unique double syringe design allows for convenient and safe handling, as the whole preparation process takes place in a closed system
- The ACP System is more affordable, easier to use, and has a quicker procedure time when compared to other conventional PRP devices
- White and red blood cells are NOT concentrated within the ACP system. These cells can cause a detrimental effect on the healing process due to release of degradative proteins and reactive oxygen species [8,9]

Double Syringe

Cap for Double Syringe

ACP Cart and Centrifuge

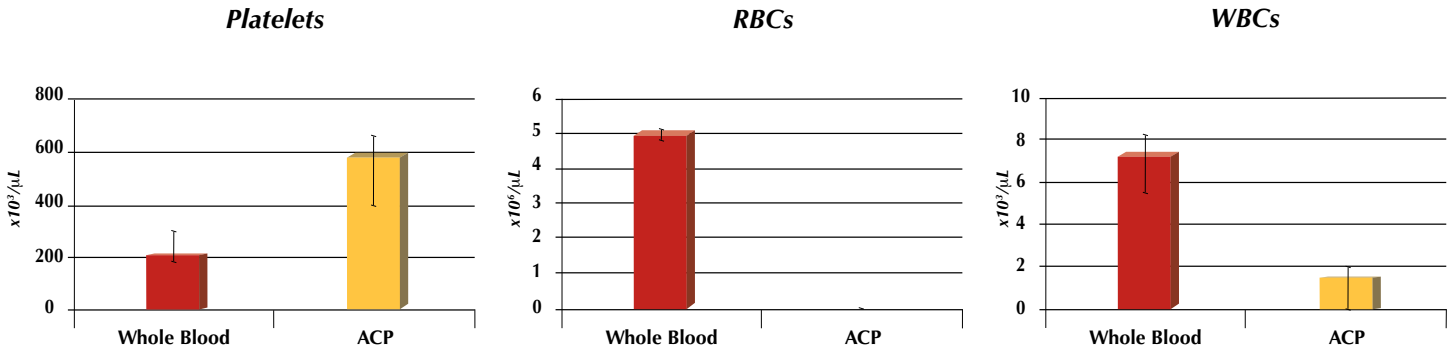
	Arthrex ACP	Other PRP Systems
Volume of patient blood drawn	16 mL	60-120 mL
Is anticoagulant (ACD-A) required?	No	Yes
Centrifugation steps	1x	1-2x
Centrifugation time	5 min	15-30 min
Does it concentrate red and white blood cells?	No: reduces	Yes: concentrates
Can be clotted prior to surgical delivery?	Yes	Yes

Mechanism of Action

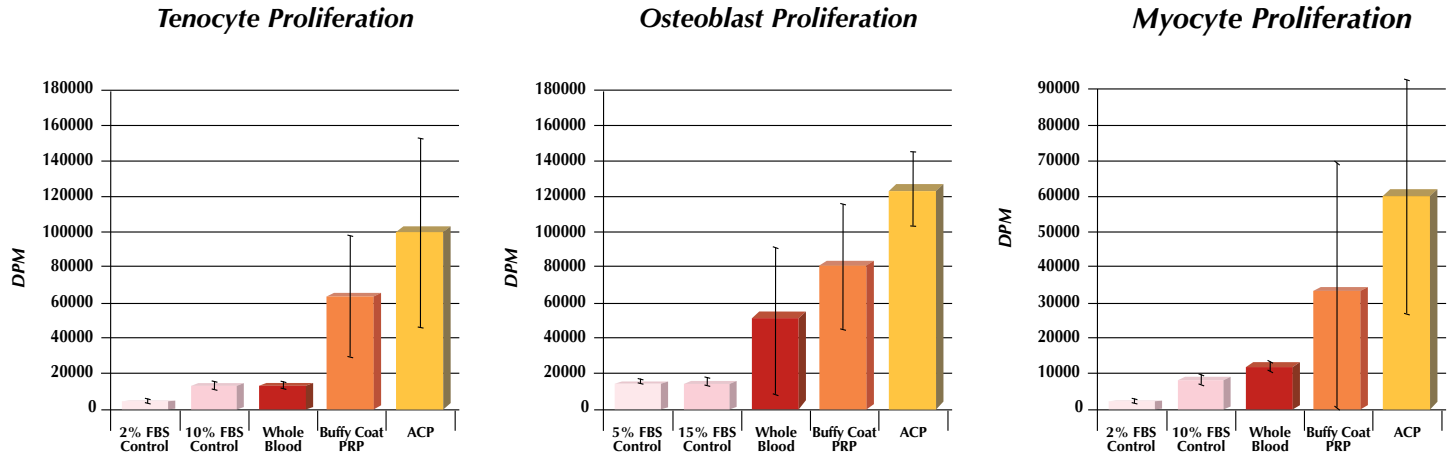
Outside the bloodstream, platelets become activated and release proliferative and morphogenic proteins. These growth factors are known to be relevant for healing in a variety of tissue types.[1,2] They appear to work synergistically to invoke the following benefits:[3-5]

- Induce proliferation and differentiation of various cell types (e.g., stem cells, osteoblasts, epidermal cells)
- Enhance/modulate production of collagen, proteoglycan and tissue Inhibitor of Metalloproteinases (TIMP)
- Stimulate angiogenesis and chemotaxis

In order to evaluate the differences between ACP and whole blood, ACP was prepared from the venous blood of 12 healthy donors and the concentration of platelets, red blood cells (RBC), and white blood cells (WBC) were measured with a standard CBC. We found the density of platelets to be more than twice as high in the ACP vs. whole blood. The concentration of inflammatory white and red blood cells in whole blood vs. ACP were drastically reduced by 10.3x and 99.4x, respectively.



In order to determine the effect ACP has on particular cell lines, *in vitro* culture work was done with tenocytes, osteoblasts, and myocytes. Peripheral blood was obtained from eight donors and proliferation of the cell lines were measured for the following five culture groups: (1) negative control, cells cultured with 2% or 5% fetal bovine serum (FBS); (2) positive/proliferative control, cells cultured with 10% or 15% FBS; (3) whole blood; (4) a buffy coat-based PRP system containing 7x platelet concentration and 4x WBC concentration; and (5) ACP. An ANOVA statistical analysis was completed to compare the different culture groups. ACP resulted in an increase in proliferation that was statistically significant ($p < 0.05$) over the negative control, positive control, and whole blood culture groups for each of the three cell lines. ACP induced proliferation was also statistically greater than the buffy coat-based PRP culture group for the osteoblast and myocyte cell lines. ACP was not statistically different from the buffy coat PRP for tenoctyes, but it did approach significance and had an increased proliferative mean.

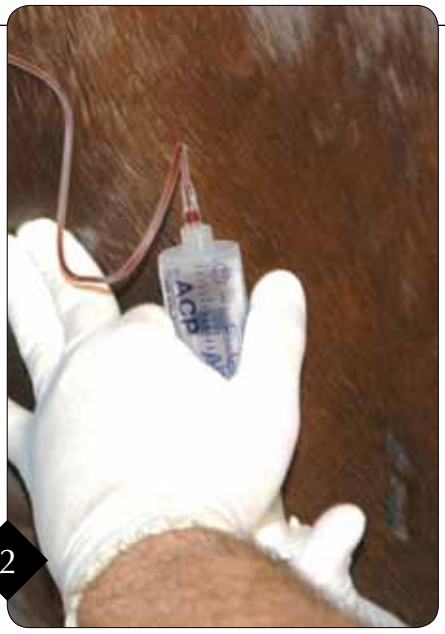


The increased proliferation for ACP vs. the other four groups could be caused by a number of factors. There may be a cellular dose response indicating that only a certain level of growth factors released from platelets are needed in order to elicit maximum proliferation. After reaching this proposed threshold, over concentrating platelets and growth factors may cause a paradoxical inhibitory effect on cell proliferation.[6,7] The inclusion of WBCs, specifically neutrophils, within a PRP product may prevent maximal growth potential due to release of degradative enzymes and reactive oxygen species.[8-10] Overall, this *in vitro* study demonstrates that ACP is the ideal PRP for cellular proliferation when compared to a buffy coat-based PRP.

Directions for use

1

Prior to withdrawing the Anticoagulant Citrate Dextrose Solution A (ACD-A), prime the outer and inner syringes by pulling each plunger completely back and forward. Withdraw approximately 1.5 mL ACD-A into the syringe. *Note: If ACP is going to be used within thirty minutes of blood withdrawal, the use of ACD-A is not required.*



2

Use an 18-20 gauge butterfly needle to perform the blood draw. Slowly withdraw by pulling back on the wings that are colored red. Fill the syringe to a maximum of 16 cc of venous blood at a rate of 1 cc every two seconds and seal the syringe with the red cap.

3

Gently rotate the syringe in order to mix the blood and the ACD-A. Place the syringe into one bucket and an appropriate size counterbalance in the opposite bucket.

4

For equine, run the centrifuge at 1100 rpm for five minutes. For canine, run the centrifuge at 1300 rpm for five minutes. Remove the syringe, taking care to keep it in an upright position to avoid mixing the plasma and red blood cells.

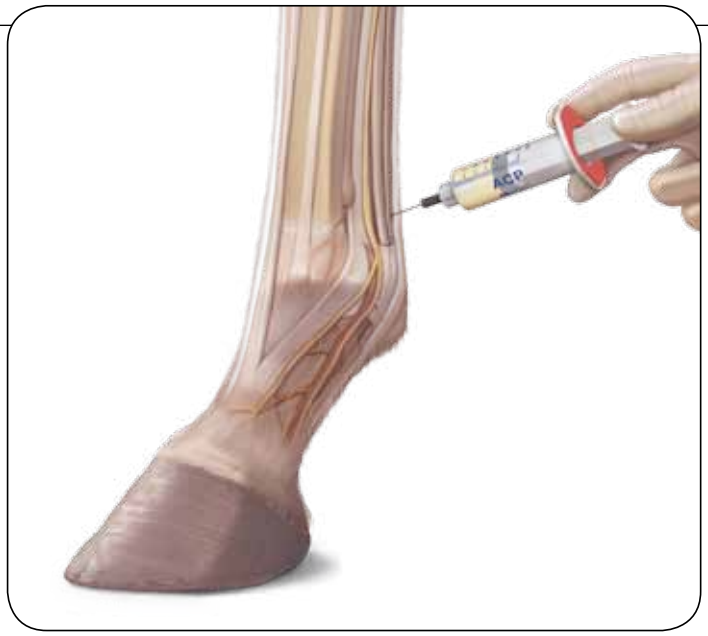
5

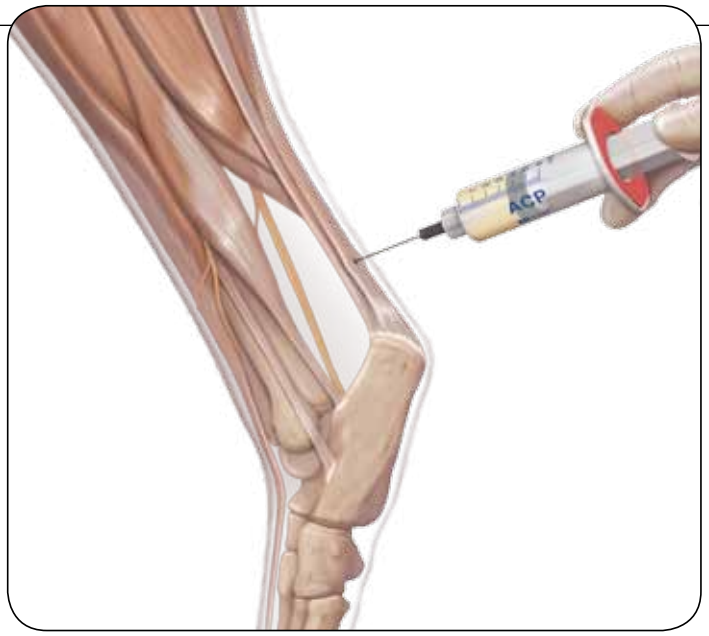
In order to transfer 4-7 mL of ACP from the larger outer syringe into the small inner syringe, slowly push down on the outer syringe's red wings, while slowly pulling up the plunger of the small inner syringe.

6

Unscrew the small inner syringe. The ACP is ready for use at the point of care. The ACP can also be transferred into a sterile cup on the sterile field and transferred into a 10 mL syringe for use. The ACP should be used within four hours after the blood draw when ACD-A is used.

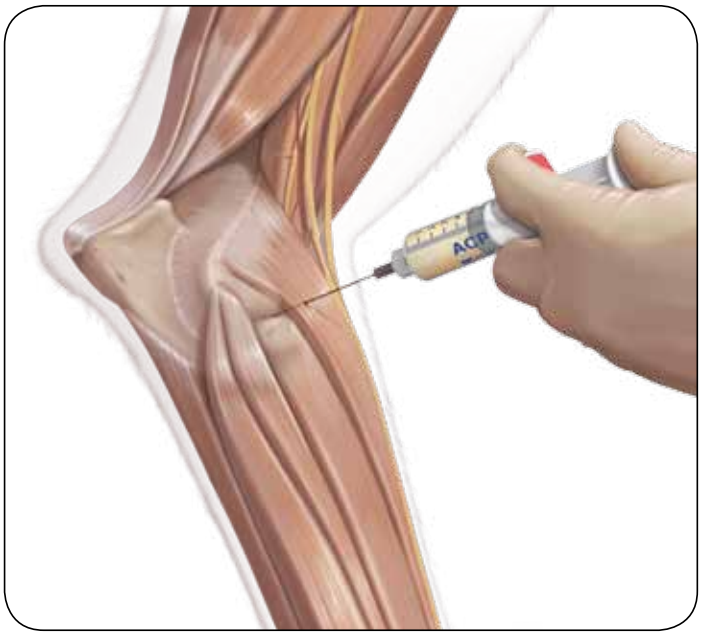
Clinical and Surgical Applications

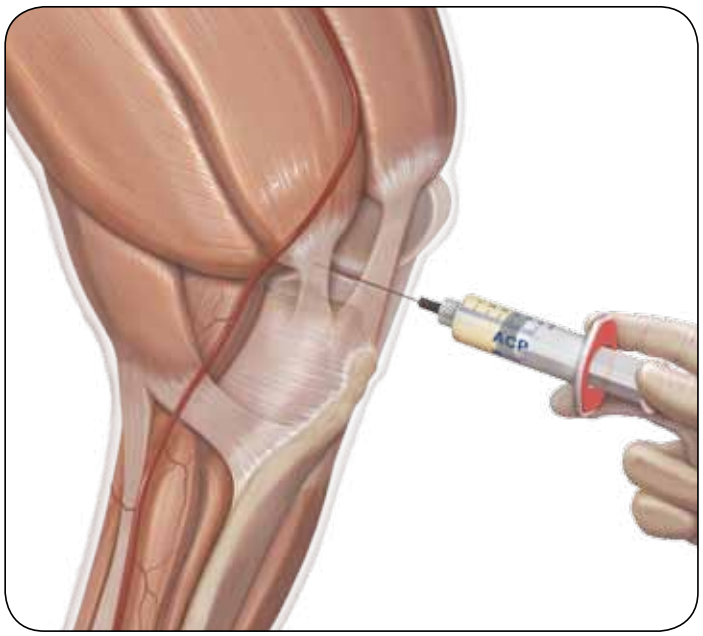




Intra-tendonous Therapy

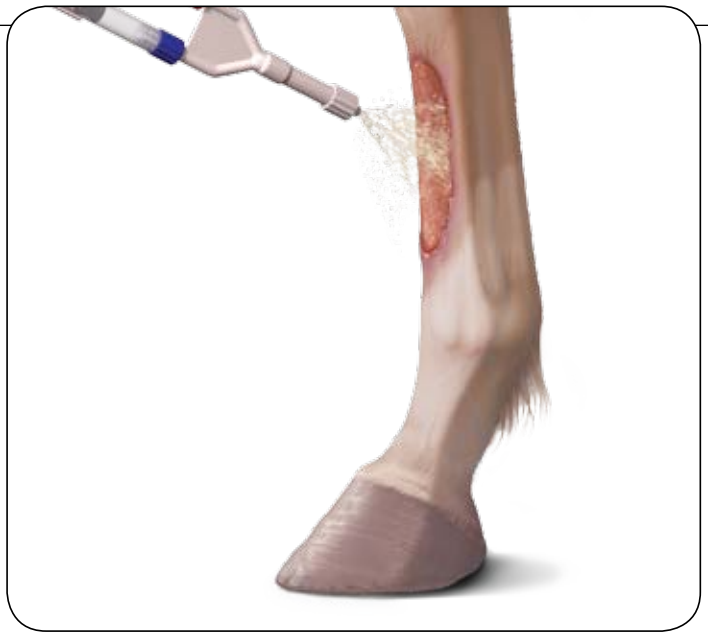
Acute or chronic tendonitis and tendonopathy can be treated with PRP injections. PRP can also be used to augment any tendon repair procedure intraoperatively. PRP has been demonstrated to increase anabolic and extracellular matrix gene expression, induce cell proliferation, improve neovascularization, advance range of motion, and promote early recovery through a number of *in vitro*, *in vivo* and clinical studies with respect to tendon therapies.[13-18]

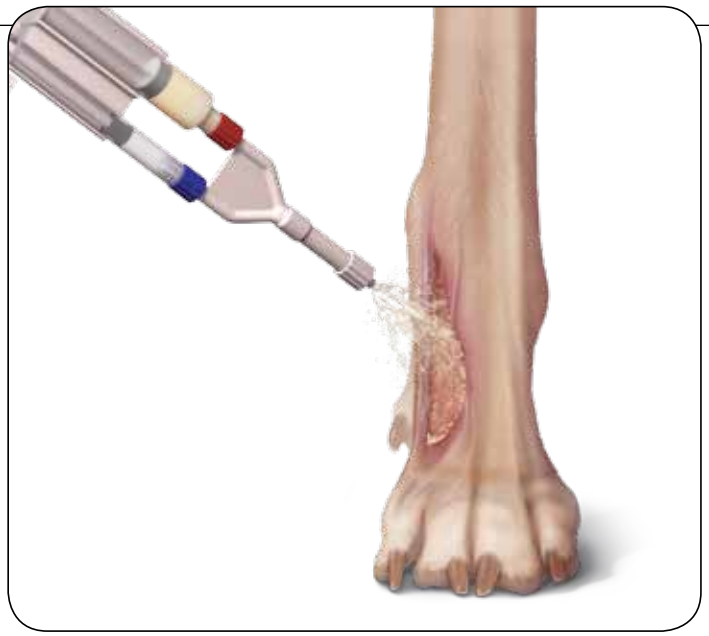




Intra-articular Therapy

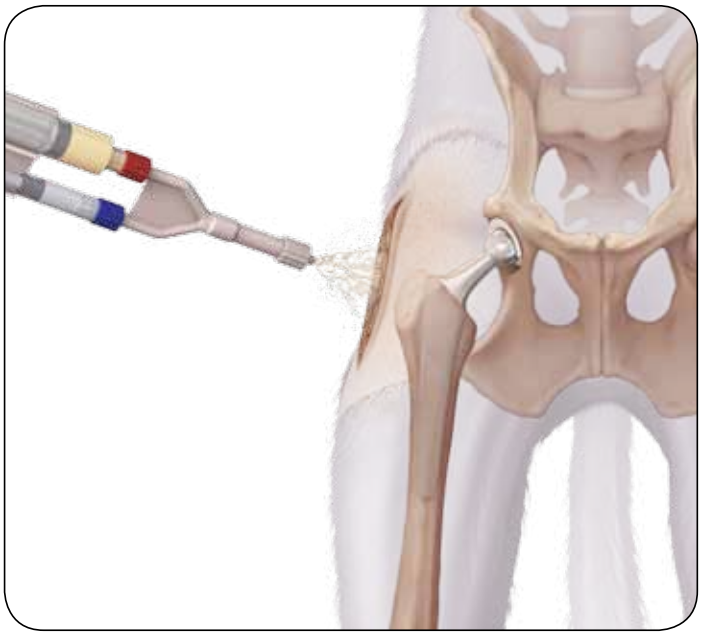
PRP has shown some significant promise with respect to intra-articular therapy for treatment of cartilage, the meniscus and the disease of osteoarthritis. Studies have been able to describe PRP as a method to increase chondrocyte extracellular matrix production, synovial hyaluronic acid production and improve patient pain/function for osteoarthritis.[19-24] Osteoarthritis is a catastrophic joint disease that severely affects clients within veterinary practices. Having the potential to provide an autologous therapeutic solution to help remedy pain associated with this disease becomes an advantageous option.





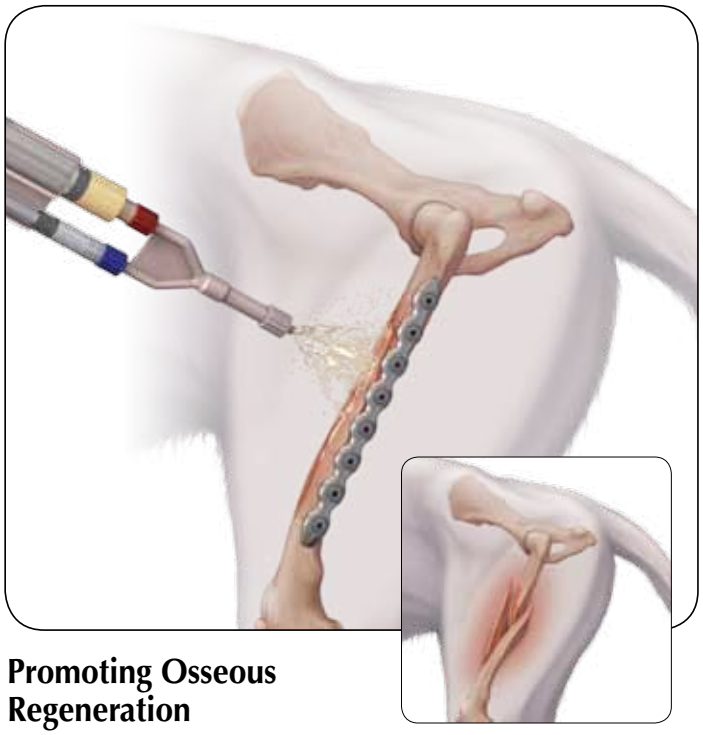
Wound and Ulcer Restoration

Cutaneous ulceration and cutaneous wounds are common problems within veterinary practices. Impairment of the healing process may occur preventing these lesions from closing. Supplementation with platelets from PRP promotes the release of growth factors and the formation of fibrin matrices, which will induce angiogenesis, extracellular matrix formation and re-epithelialization leading toward the eventual closure of these defects.[2,25-28]



Augmenting Total Joint Replacements

The use of joint prosthetics requires invasive procedures that come with significant rehabilitation concerns and the possibility of major complications. PRP has been used for many years for patients receiving a total joint replacement to help reduce the incidence of arthrofibrosis, improve postoperative range of motion, decrease the risk of infection, enhance wound healing, prevent excess blood loss due to increased hemostasis, and reduce pain levels with less narcotic medications required.[11,12,29-31]



Promoting Osseous Regeneration

Bone healing is imperative within veterinary orthopaedics when managing fractures, osteotomies and fusions. A major concern is limiting the numbers of malunions and nonunions that occur by considering the mechanical and biological factors that are required for osseous formation. Leukocyte-reduced, platelet-rich plasma has been found to improve bone regeneration within defect models, for nonunions, in combination with stem cells and for fusions.[32-37]

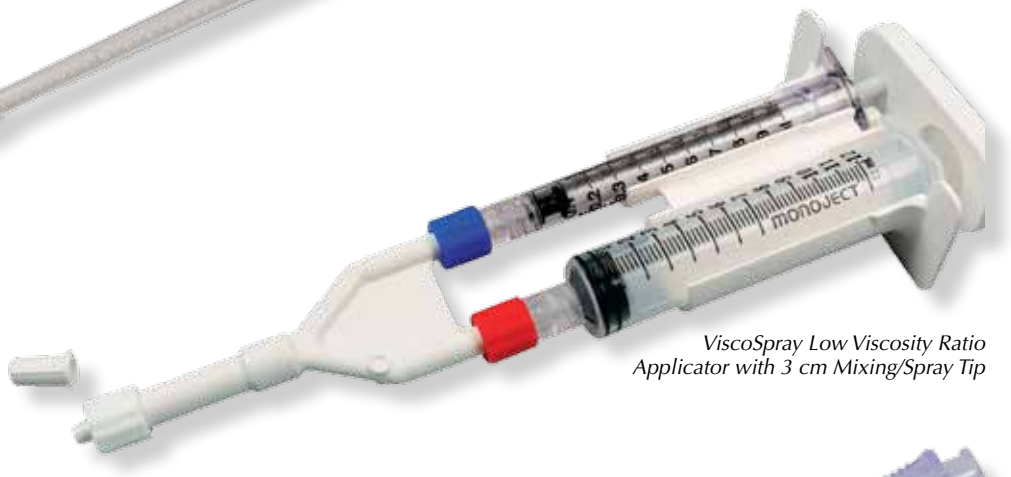
ViscoGel® and ViscoSpray®

Use to facilitate mixing and delivery of ACP to create an activated gel or spray

Key Features:

- Quick and simple to attach/detach
- Easy to fill – no need to disassemble
- 11:1 ratio allowing homologous mixture of ACP and a gelling agent solution, respectively
- Gelling agent solution typically consists of thrombin and 10% calcium chloride solution - 1000 IUs thrombin: 1mL CaCl [11,12]
- Use to provide a low or high viscosity activated, gelatinous form of ACP
- Extra long, blunt, fenestrated and beveled delivery needles

ViscoGel High Viscosity Ratio Applicator with 10 cm Mixing Tip

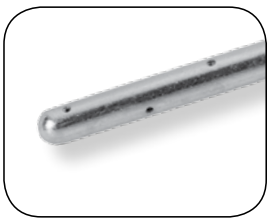


ViscoSpray Low Viscosity Ratio Applicator with 3 cm Mixing/Spray Tip

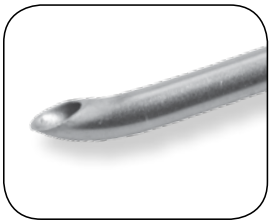
Fenestrated Delivery Needle 17 gauge, 14.63 cm from hub, 8 holes along first 1.27 cm of tip (.3 mm diameter holes)

Tuohy Delivery Needle 17 gauge, 15.07 cm from hub

Both delivery needles can be used with either one of the Ratio Applicators and mixing tips



Gel easily dispersed from tip



Precontour either delivery needle with the Arthrex Cannula Bending Tool

Product and Ordering Information:

ACP/Double Syringe with Cap	VAR-1200S	IRAP Rotor	VAR-1021
Anticoagulant ACD-A, 50 mL	VAR-1205	ACP Cart	ABS-10100
Counterbalance	ABS-10027	ViscoGel High Viscosity	ABS-10050
Centrifuge, Hettich - w/o Rotor	VAR-1003C	ViscoSpray Low Viscosity	ABS-10051
Swing Out Rotor, 4 x 100 mL		Fenestrated Delivery Needle	ABS-20000
Buckets with Covers	VAR-1261	Tuohy Delivery Needle	ABS-21000
Bucket and Cap	VAR-1262	Cannula Bending Tool	AR-6650

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