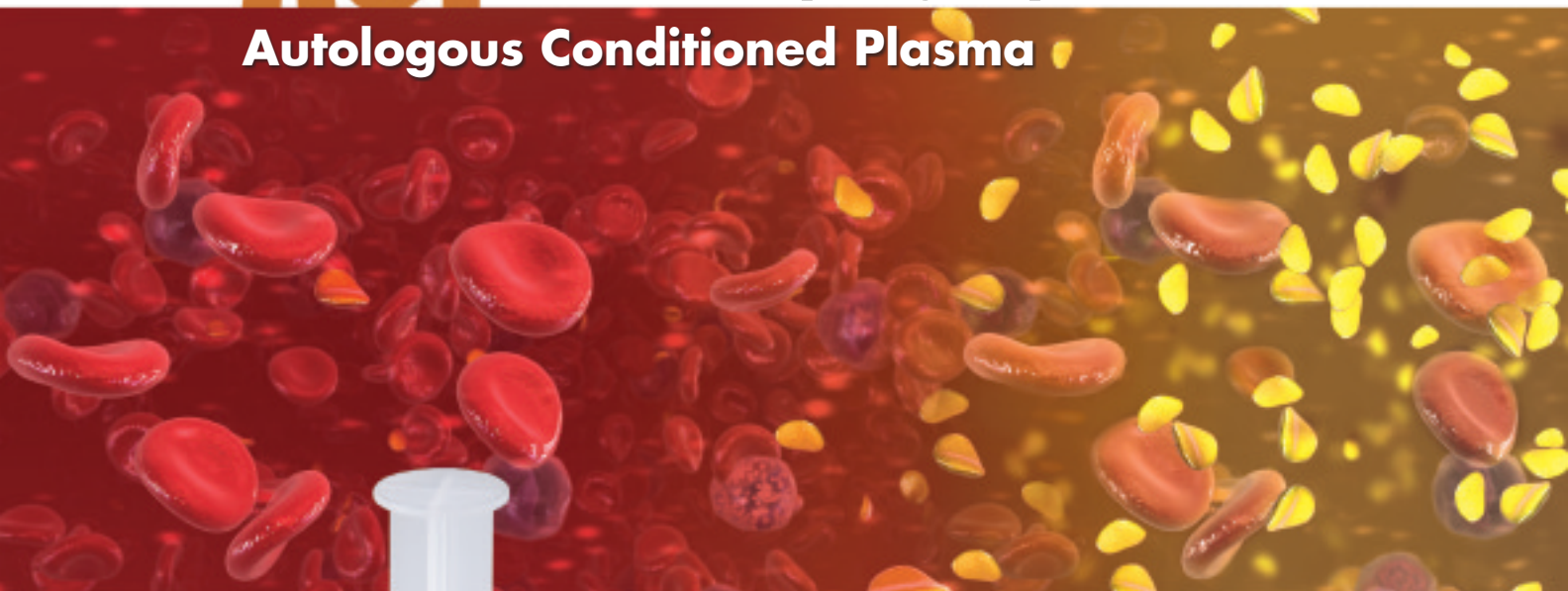


ACP

Double Syringe System

Autologous Conditioned Plasma



For the safe and rapid preparation of platelet-rich plasma



Arthrex® 

Arthrex ACP®

Introduction

There has been increased interest in autologous blood products for use in a number of orthopaedic therapies. The main effects of platelet-rich plasma are thought to be caused by growth factors released from the platelets, which may play a beneficial role within these therapies.



Cap for Double Syringe

Double Syringe

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 blood cells, specifically neutrophils, 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.^{1,2}



Rotor Set with Buckets



ACP Cart and Centrifuge

ABS-10011 – Series I ACP Kit Components:

Description	Quantity
Double Syringe	1
Double Syringe Luer Cap	1
Tourniquet – disposable, latex-free	1
Alcohol Pad	1
Angel Wing Infusion Set, 19G	1
Gauze Sponge, 2x2 in.	1
Band-Aid®, latex-free	1
Patient Label	2



ABS-10012 – Series II ACP Kit Components:

Description	Quantity
Double Syringe	2
Double Syringe Luer Cap	2
Tourniquet – disposable, latex-free	1
Alcohol Pad	1
Angel Wing Infusion Set, 19G	1
Gauze Sponge, 2x2 in.	1
Band-Aid®, latex-free	1
Patient Label	4
Hypodermic Needle, 20G, 1.5"	2
3-Way Stopcock	1
Side Pinch Clamp	1
40 mL Cup	2
Female-to-Female Luer Connector	1



The Series I ACP Blood Draw Kit contains one syringe along with everything needed for a standard blood draw: tourniquet, alcohol pad for the draw site, butterfly needle for drawing blood, gauze sponge and band-aid for post-draw, and patient labels for the double syringe.

The Series II ACP Blood Draw Kit contains two syringes and the same blood draw equipment found in the Series I Kit, along with a few added features: hypodermic needles for drawing up ACD-A, a 3-Way Stopcock for attachment of both syringes when drawing blood, a side pinch clamp if preferring to draw one syringe at a time, 40 mL cups for containment of ACP on a sterile field, and a female-to-female luer connector if preferring to combine the ACP collected within the two inner syringes into one larger syringe.

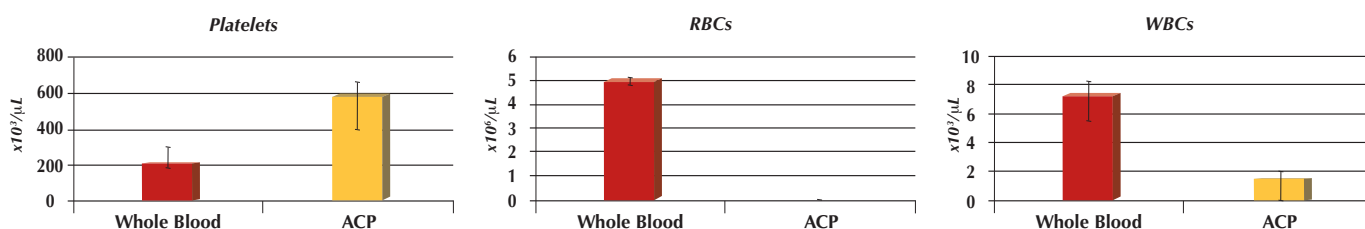
ACD-A obtained separately in 50mL bottle: ABS-10008

Mechanism of Action

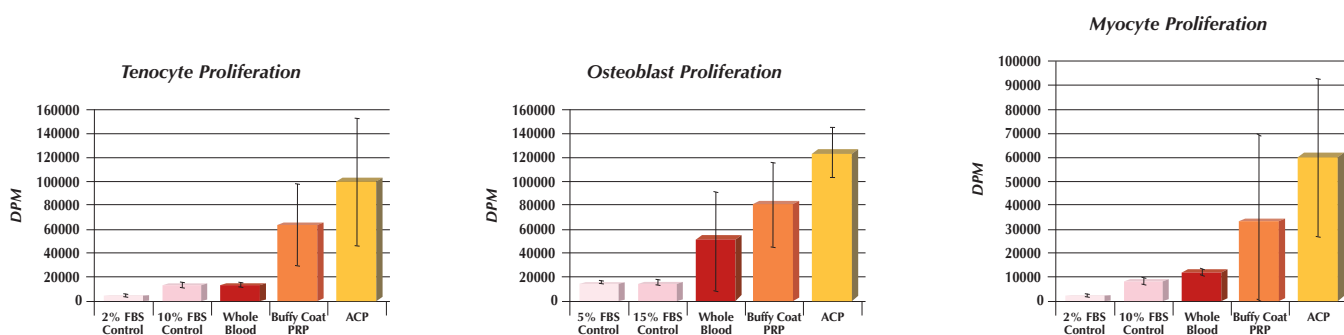
Outside the bloodstream, platelets become activated and release proliferative and morphogenic proteins. These proteins appear to work synergistically to invoke the following benefits:^{3,4,5}

- Induce proliferation and differentiation of various cell types (e.g., progenitor 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 human 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 tenocytes, 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 within a PRP product may prevent maximal growth potential due to release of degradative enzymes and reactive oxygen species.^{1,2} Overall, this *in vitro* study demonstrates that ACP is the ideal PRP for cellular proliferation when compared to a buffy coat-based PRP.

	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

Directions for Use

Procedure



1

Prior to withdrawing ACD-A, prime the outer and inner syringes by pulling each plunger completely back and forward before starting the process. 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

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. The 19-gauge butterfly needle found in the Series I and Series II Kits is recommended to draw the blood.



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

Run the centrifuge at 1500 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

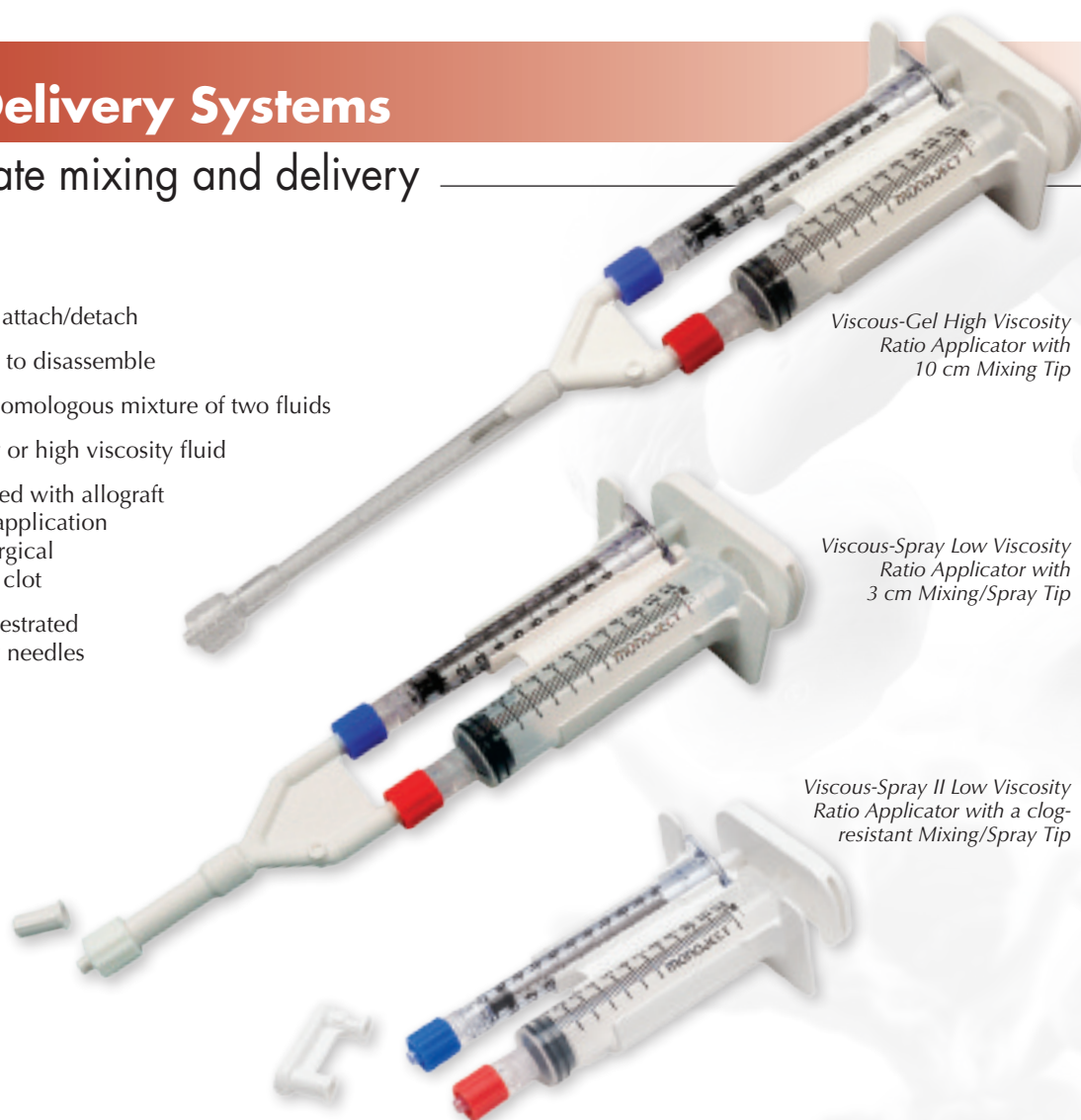
Unscrew the small inner syringe. The ACP is ready for use at the point of care. The ACP can also be transferred into a sterile cup on the sterile field and transferred into a 10 mL syringe for use. The ACP should be used within four hours after the blood draw when ACD-A is used.

Viscous Delivery Systems

Use to facilitate mixing and delivery

Key Features:

- Quick and simple to attach/detach
- Easy to fill – no need to disassemble
- 11:1 ratio allowing homologous mixture of two fluids
- Use to provide a low or high viscosity fluid
- ACP/PRP can be mixed with allograft or autograft prior to application to an orthopaedic surgical site as a spray, gel or clot
- Extra long, blunt, fenestrated and beveled delivery needles



Viscous-Gel High Viscosity Ratio Applicator with 10 cm Mixing Tip

Viscous-Spray Low Viscosity Ratio Applicator with 3 cm Mixing/Spray Tip

Viscous-Spray II Low Viscosity Ratio Applicator with a clog-resistant 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)*

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

*Tuohy Delivery Needle
17 gauge, 15.07 cm from hub*



Gel easily dispersed from tip

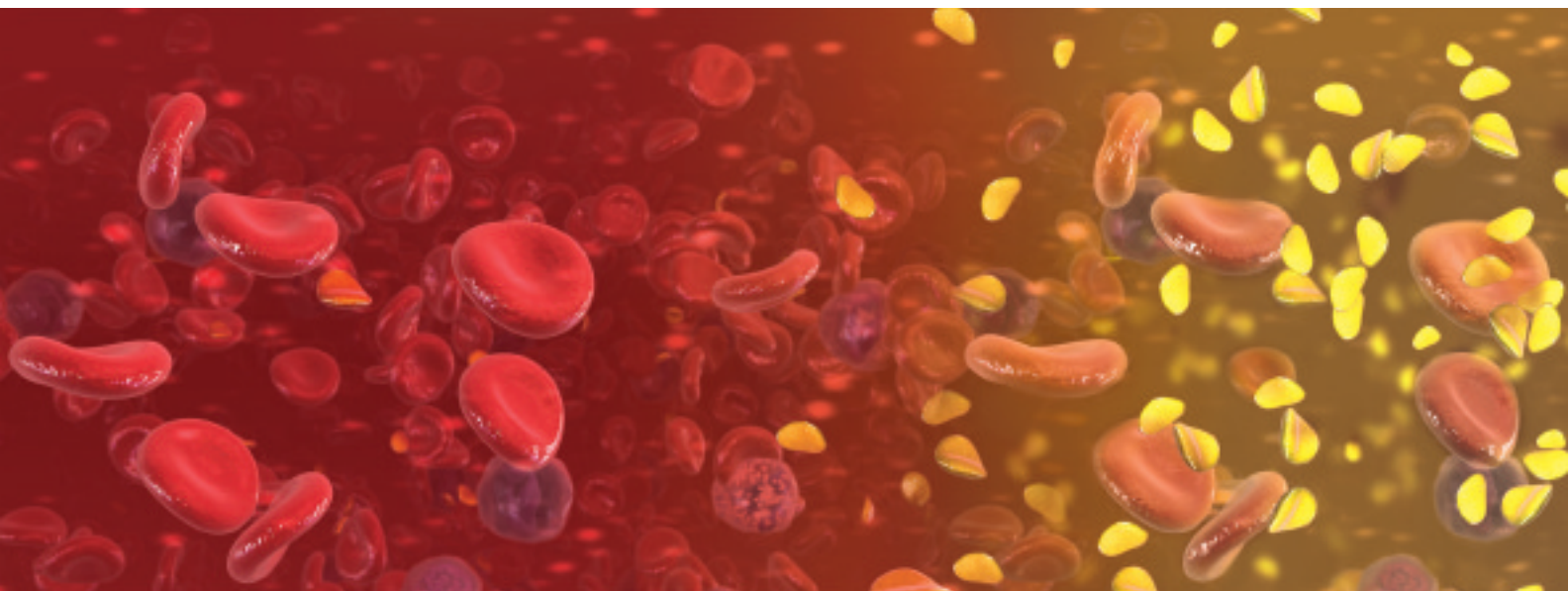


Precontour either delivery needle with the Arthrex Cannula Bending Tool



References:

- 1 Scott A, et al, *What do we mean by the term "inflammation"? A contemporary basic science update for sports medicine*, Br J Sports Med., 2004; 38(3): 372-80.
- 2 Jiang N, et al, *Respiratory protein-generated reactive oxygen species as an antimicrobial strategy*, Nat Immunol., 2007; 8(10): 1114-22.
- 3 Borzini P, and Mazzucco L., *Tissue Regeneration and in Loco Administration of Platelet Derivates: Clinical Outcomes, Heterogeneous Products, and Heterogeneity of Effector Mechanisms*; Transfusion, 2005; 45: 1759 -1767.
- 4 Edwards D, et al, *Transforming Growth Factor Beta Modulates the Expression of Collagenase and Metalloproteinase Inhibitor*, The EMBO Journal, 1987, 6, 7,1899-1904.
- 5 Lynch S, et al, *Role of Platelet-derived Growth Factor in Wound Healing: Synergistic Effects with other Growth Factors*, Proc. Natl. Acad. Sci. USA, 1987; 84: 7696-7700.
- 6 Graziani F, et al, *The In Vitro Effect of Different PRP Concentrations on Osteoblasts and Fibroblasts*, Clin Oral Implants Res., 2006; 17(2): 212-9.
- 7 Weibrich G, et al, *Effect of Platelet Concentration in Platelet-rich Plasma on Peri-implant Bone Regeneration*, Bone, 2004; 34(4): 665-71.



Product and Ordering Information:

ACP/Double Syringe with Cap	ABS-10010S	Bucket Cap	ABS-10023
Series I ACP Blood Draw Kit	ABS-10011	Counterbalance	ABS-10027
Series II ACP Blood Draw Kit	ABS-10012	Viscous-Gel High Viscosity	ABS-10050
Anticoagulant ACD-A, 50 mL	ABS-10008	Viscous-Spray Low Viscosity	ABS-10051
Centrifuge	ABS-10020	Viscous-Spray II Low Viscosity	ABS-10052
Rotor Set with Buckets and Caps	ABS-10021S	Fenestrated Delivery Needle	ABS-20000
Bucket	ABS-10022	Tuohy Delivery Needle	ABS-21000
ACP Cart	ABS-10100	Cannula Bending Tool	AR-6650

This description of technique is provided as an educational tool and clinical aid to assist properly licensed medical professionals in the usage of specific Arthrex products. As part of this professional usage, the medical professional must use their professional judgment in making any final determinations in product usage and technique. In doing so, the medical professional should rely on their own training and experience and should conduct a thorough review of pertinent medical literature and the product's Directions For Use.

The Double Syringe (ACP) System is used to facilitate the safe and rapid preparation of autologous platelet-rich-plasma (PRP) from a small sample of blood at the patient's point of care. The PRP can be mixed with autograft and allograft bone prior to application to an orthopaedic surgical site as deemed necessary by the clinical use requirements.

