

Arthrex ACP[®] Double Syringe

ACP – Autologous Conditioned Plasma



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Made in Germany



Introduction

Interest in autologous blood products such as blood plasma has grown in a number of orthopedic therapies. The healing effect of plasma is supported by growth factors released by thrombocytes. The ACP double-syringe system is used for the sterile separation of non-homogeneous liquids. This device allows the withdrawal of blood from the human body using a commercially available cannula with a Luer lock connection.

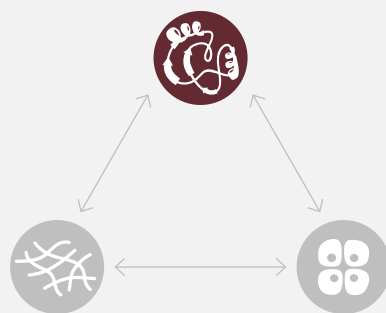
Features and Benefits

- Two-in-one – unique system for the preparation of autologous conditioned plasma
- ACP preparation with the Arthrex ACP double syringe can be performed in minutes
- The Arthrex ACP double syringe is a closed, sterile system for use in the doctor's office and operating room
- The double-syringe design allows for easy, convenient and safe handling

Arthrex ACP® Healing Triad

The Arthrex ACP healing triad comprises the cornerstones required for healing: growth factors, matrix, and regenerative cells.

ACP covers the growth factor aspect.



- ▶ Growth factors
- ▶ Matrix
- ▶ Regenerative cells

Mechanism of Action

When blood is prepared using the described method with the Arthrex ACP double syringe, the plasma contains a platelet concentration increased by about two to three times.⁷ Outside the bloodstream, platelets become activated and release proteins (eg, growth factors). These growth factors are known to be relevant for healing in a variety of tissue types and they appear to work synergistically.^{1,2,3}

Major Effects of Growth Factors

- Induced proliferation and differentiation of various cell types (eg, osteoblasts, chondroblasts)⁴
- Improved matrix formation (eg, collagen and proteoglycan production)
- Stimulation of angiogenesis and chemotaxis

As different studies have already shown, white blood cells are not concentrated.^{5,6,7} The supernatant should not contain red blood cells.^{7,8} A significant increase in the cell proliferation of muscle, tendon, and bone cells has been documented in vitro.⁸

Studies have confirmed the effectiveness of ACP therapy for the following indications:

- Mild to moderate osteoarthritis (grade I - III)⁹⁻¹¹
- Epicondylitis¹²
- Plantar fasciitis¹³
- Patellar tip syndrome¹⁴

Centrifuge, Cart for Centrifuge (Optional)



Centrifuge



Cart for centrifuge (optional)



Accessories:

ACP double syringe, anticoagulant (optional), centrifuge



Important: Take the double syringe out of the packaging, tighten the inner syringe (turn it clockwise) (1), and then press both plungers together (2).

Optional: Withdraw approximately 1.5 ml anticoagulant into the syringe by drawing back only the plunger of the outer syringe that is colored red. If the ACP is injected within 30 minutes after withdrawing, the use of anticoagulant is not required.



Withdraw approx. 15 ml of venous blood carefully and slowly. Once finished, seal the double syringe with the red cap.

Important: Only retract the plunger of the large syringe (red wings).

Using an anticoagulant, gently rotate the syringe in order to mix blood and anticoagulant.



Place the syringe in the centrifugation container. Place a suitable counterweight (eg, an ACP double syringe filled with water) on the opposite side.



5
Centrifuge at 1 500 rpm for 5 minutes (program A).
Then carefully remove the double syringe.

Note: Remove the syringe, taking care to keep it in an upright position (red cap downwards) to avoid mixing.



6
In order to transfer the supernatant (ACP) from the larger outer syringe into the small inner syringe, slowly push down on the outer syringe while slowly pulling up the plunger of the small inner syringe.



7
Unscrew the small inner syringe and place a needle onto it. The ACP is ready for use at the point of care.

Optional: Transfer the ACP in a sterile cup for intraoperative usage.



Ordering Information

Product Description	Item Number
Arthrex ACP® Double-Syringe System	
Arthrex ACP® double syringe	ABS-10014
Arthrex ACP® kit series I	ABS-10011
Drucker Centrifuge 6-tube horizontal general purpose centrifuge (human use)	HORIZON 24-AH
Hettich Centrifuge Centrifuge Hettich Rotofix 32A with swing out rotor, 220V Centrifuge Hettich Rotofix 32A with swing out rotor, 110V Bucket for Hettich Rotofix 32A Screw cap for Hettich bucket Counterweight for centrifugation of Arthrex ACP® double syringe, 15 ml	1206-Art 1206-01-Art 1491-2 1492-2 ABS-10027
Accessories Cart for centrifuge, 45 cm	KU.1079.800

An anticoagulant can be ordered on request.

Products advertised in this brochure/surgical technique guide may not be available in all countries. For information on availability, please contact Arthrex Customer Service or your local Arthrex representative.

References

1. Borzini P, 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.
Literature review article discussing the complexity of comparing publication articles on PRP induced tissue regeneration, due to many variabilities in PRP preparation, application techniques and other heterogeneities.
2. Edwards D et al: Transforming Growth Factor Beta Modulates the Expression of Collagenase and Metalloproteinase Inhibitor. *The EMBO Journal*. 1987; 6(7): 1899 - 1904.
In-vitro study, showing that the expression of genes, whose products act towards cartilage healing are positively influenced by transforming growth factor- β .
3. 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.
In-vitro study demonstrating that healing processes are not controlled by a single growth factor but are a result of the presence of multiple growth factors.
4. Graziani F et al: The In Vitro Effect of Different PRP Concentrations on Osteoblasts and Fibroblasts. *Clin Oral Implants Res*. 2006; 17(2): 212 - 219.
In-vitro study examining the growth effect of different platelet concentrations in PRP on different cell types, suggesting an optimal platelet concentration of 2.5x .
5. Sundman E, Cole B, Fortier L: Growth Factor and Catabolic Cytokine Concentrations Are Influenced by the Cellular Composition of Platelet-Rich Plasma. *American Journal of Sports Medicine*. 2011; 39(10): 2135 - 2140
In-vitro study quantifying various growth factor concentrations of ACP and a competitor product. This study also demonstrates the decrease of leukocytes in ACP and the subsequently low concentration of catabolic growth factors.
6. Kisiday J et al: Effects of Platelet-Rich Plasma Composition on Anabolic and Catabolic Activities in Equine Cartilage and Meniscal Explants. *Cartilage*. 2012; 3: 245 - 254
In-vitro study to assess the effects of different PRP preparations (single spin ACP and double spin) demonstrating that single spin PRP preparations, including Arthrex ACP®, are more advantageous to stimulate regenerative processes in cartilage and meniscal explants.
7. Mazzocca A et al: Platelet-rich plasma differs according to preparation method and human variability. *Journal of Bone & Joint Surgery*. 2012; 94(4): 308 - 316
In-vitro study comparing the composition and growth factor concentration of a double-spin and two single spin protocols of PRP preparations including Arthrex ACP®. This study shows that plasma preparations of ACP increase the platelet concentrations ~2,5x and decreases the concentration of white blood cells by ~9x which is comparable to an established double spin protocol.

8. Mazzocca A et al: The positive effects of different platelet-rich plasma methods on human muscle, bone, and tendon cells. *The American Journal of Sports Medicine*. 2012; 40(8): 1742 - 1749
In-vitro study comparing the proliferation capacity of cells treated with PRP preparations from a double-spin and two single spin protocols including Arthrex ACP®. It is shown that ACP PRP preparations induced the highest proliferation rates throughout PRP preparations, even if others had higher platelet concentrations.
9. Smith PA: Intra-articular Autologous Conditioned Plasma Injections Provide Safe and Efficacious Treatment for Knee Osteoarthritis. *The American Journal of Sports Medicine*. 2016; 44(4): 884 - 891
 Randomized clinical safety study of 30 OA patients that failed nonoperative OA treatment for at least 6 weeks, showing that over the course of 12 months, patients treated with ACP had a significantly better WOMAC scoring compared to those treated with a placebo.
10. Cerza F et al: Comparison between hyaluronic acid and platelet-rich plasma, intra-articular infiltration in the treatment of gonarthrosis. *The American Journal of Sports Medicine*. 2012; 40(12): 2822 - 2827
 Randomized clinical study to compare the treatment of 4 subsequent intraarticular injections of ACP or Hyaluronic Acid (HA) on 120 Kellgren-Lawrence grade I-III OA patients. Over the course of 6 months, WOMAC score of ACP treated patients improved significantly compared to HA treatment, independent of the OA severity.
11. Cole BJ et al: Hyaluronic Acid Versus Platelet-Rich Plasma: A Prospective, Double-Blind Randomized Controlled Trial Comparing Clinical Outcomes and Effects on Intra-articular Biology for the Treatment of Knee Osteoarthritis. *The American Journal of Sports Medicine*. 2017; 45(2): 339 - 346
 Randomized, Level I clinical study on 111 symptomatic unilateral knee OA patients comparing intraarticular HA injections against leukocyte poor PRP injection showing a significant benefit for patients with PRP treatment in IKDC and VAS pain score in a 1 year follow-up.
12. Ford RD et al: A retrospective comparison of the management of recalcitrant lateral elbow tendinosis: platelet-rich plasma injections versus surgery. *Hand (N Y)*. 2015; 10(2): 285 - 291
 Retrospective chart review of patients suffering from lateral elbow tendinosis receiving either surgery or PRP treatment, demonstrating that PRP treatment gave similar results in regards to pain & symptom relief, as well as regaining range of motion.
13. Lebedzinski R et al: A randomized study of autologous conditioned plasma and steroid injections in the treatment of lateral epicondylitis. *International Orthopaedics*. 2015; 39(11): 2199 - 2203
 Prospective, randomized study comparing the treatment of lateral epicondyle tendinopathies with ACP or betamethasone showing a favorable DASH score after 1 year of patients treated with ACP.

 Opposite view:
 Montalvan B et al: Inefficacy of ultrasound-guided local injections of autologous conditioned plasma for recent epicondylitis: results of a double-blind placebo-controlled randomized clinical trial with one-year follow-up. *Rheumatology*. 2016; 55(2): 279 - 285
 Double-blind randomized study with very limited patient number comparing PRP and placebo treatment in epicondylitis. The study shows a reduced but non-significant decrease in pain of PRP treated patients.
14. Chew KT et al: Comparison of autologous conditioned plasma injection, extracorporeal shockwave therapy, and conventional treatment for plantar fasciitis: a randomized trial. *PM&R*. 2013; 5(12): 1035 - 1043
 Randomized clinical study showing the effectiveness of ACP in treating plantar fasciitis in 59 patients, comparing conventional treatment alone, treatment accompanied with PRP (ACP) or accompanied with extracorporeal shockwave therapy as measured in pain reduction (VAS score) or AOFAS. A significant improvement in VAS and AOFAS score compared to both other treatments was observed.
15. Zayni R et al: Platelet-rich plasma as a treatment for chronic patellar tendinopathy: comparison of a single versus two consecutive injections. *Muscles Ligaments Tendons Journal*. 2015; 5(2): 92 - 98
 Prospective clinical study showing the benefit of multiple PRP injections compared to single injections as shown on patellar tendinopathy.

For information on the studies please contact your Arthrex representative.

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 professionals must use their professional judgment in making any final determinations in product usage and technique. In doing so, the medical professionals 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.



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