



The Arthrex ACP double-syringe 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 orthopedic surgical site as deemed necessary by the clinical use requirements. There has been increased interest in autologous blood products for use in a number of orthopedic therapies.

In CE accepting countries the devices comprised of the Arthrex ACP system are indicated for the treatment of osteoarthritis of the knee, rotator cuff repair, and tendinosis of the elbow.

ESSKA Consensus
Project
De Girolamo L
Laver L

Osteoarthritis of the Knee

[The Use of Injectable Orthobiologics for Knee Osteoarthritis: A Formal ESSKA Consensus. Part 1: Blood-Derived Products \(PRP\). 2022. www.esska.org/page/projects](https://www.esska.org/page/projects)

- Profiling the ideal knee OA patient for PRP / blood-derived product use is complex and multi-factorial
- There is enough preclinical and clinical evidence to support the use of PRP in knee OA
- The consensus group supports the use of PRP over HA for knee OA due to overall clinical improvement and expected longer-lasting effects, but there are different formulations of the products that may introduce some bias in the conclusions of meta-analyses
- The consensus group considers both LP-PRP and LR-PRP valid options for the management of knee OA
- A range of 2-4 injections with an interval of 1-3 weeks is recommended

[Double-Blind Randomized Controlled Trial Comparing Platelet-Rich Plasma With Intra-Articular Corticosteroid Injections in Patients With Bilateral Knee Osteoarthritis. Cureus. 2022;14\(9\):e29744. doi:10.7759/cureus.29744](https://doi.org/10.7759/cureus.29744)

- Randomized, double-blind trial comparing intra-articular ACP injection in 1 knee and methylprednisolone injection into the contralateral knee in subjects with radiologically confirmed mild-to-moderate bilateral knee osteoarthritis
- 29 subjects (58 knees) were evaluated at 6 weeks, 3 months, and 6 months
- ACP and corticosteroid injections were effective in improving pain, stiffness, and function. Maximal improvement at 6 weeks and 3 months.
- No significant difference observed between ACP and corticosteroid injection

Pretorius J,
Nemat N,
Alsayed A,
et al

Sun SF,
Hsu CW,
Lin HS,
et al

[A Single Intra-Articular Platelet-Rich Plasma Improves Pain and Function for Patients With Early Knee Osteoarthritis. Analysis by Radiographic Severity and Age.](#) *J Back Musculoskeletal Rehabil.* 2022;35(1):93-102. doi: 10.3233/BMR-200193

- Single intra-articular ACP injection for patients with knee OA (Kellgren-Lawrence grade 1-2). Assessed at 1, 3, and 6 months post-injection.
- n=38 subjects
- Significant reduction in VAS at follow-up time points, compared to baseline
- Significant improvements in WOMAC, Lequesne index, single leg stance test, and consumption of analgesics from baseline

Belk JW,
Kraeutler MJ,
Houck DA,
Goodrich JA,
Dragoo JL,
McCarthy EC

[Platelet-Rich Plasma Versus Hyaluronic Acid for Knee Osteoarthritis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials.](#) *Am J Sports Med.* 2021 Jan;49(1):249-260. doi: 10.1177/0363546520909397.

- 18 RCTs: comparing n=811 (PRP) to n=797 (HA)
- Mean improvement was significantly higher in the PRP group (44.7%) than the HA group (12.6%) for WOMAC total scores
- PRP group had significantly better scores at the latest follow-up in 6 out of 11 VAS-based studies and 3 out of 6 Subjective IKDC-based studies
- Leukocyte-poor PRP was associated with significantly better Subjective IKDC scores versus leukocyte-rich PRP

Arliani GG,
Durigon TS,
Pedroso JP,
Gerreira GF,
Oksman D,
Oliveira VO

[Intra-Articular Infiltration of Platelet-Rich Plasma Versus Hyaluronic Acid in Patients With Primary Knee Osteoarthritis: Preliminary Results From a Randomized Clinical Trial.](#) *Rev Bras Ortop.* 2021; 57(3);402-408. Doi: 10.1055/s-0041-1724082

- Randomized clinical trial assessing hyaluronic acid (HA) versus autologous conditioned plasma (ACP)
- n=29 patients (HA=15; ACP=14)
- No significant differences were observed in WOMAC score between HA and ACP between baseline and 6 month follow-up
- A significant improvement in WOMAC scores from baseline was observed in the ACP and HA group at the 1 and 3 month timepoint, suggesting early relief

Tan J,
Chen H,
Zhao L,
Huang W

[Platelet-Rich Plasma Versus Hyaluronic Acid in the Treatment of Knee Osteoarthritis: A Meta-Analysis of 26 Randomized Controlled Trials.](#) *Arthroscopy.* 2021 Jan;37(1):309-325. doi: 10.1016/j.arthro.2020.07.011.

- 26 RCTs with 2430 patients (PRP vs HA)
- The VAS, WOMAC total, and WOMAC physical function of the PRP group were better at 3, 6, and 12 months
- The WOMAC pain, WOMAC stiffness, EuroQoL VAS, and IKDC were better in PRP group at 6 and 12 months
- There was no significant difference in adverse events between the 2 groups



McLarnon M,
Heron, N

[Intra-Articular Platelet-Rich Plasma Injections Versus Intra-Articular Corticosteroid Injections for Symptomatic Management of Knee Osteoarthritis: Systematic Review and Meta-Analysis.](#) *BMC Musculoskelet Disord* 22, 550 (2021). <https://doi.org/10.1186/s12891-021-04308-3>

- 8 studies with 648 patients (PRP vs corticosteroids (CS))
- PRP was superior to CS in reducing OA symptoms (pain, stiffness, functionality) at 3, 6, and 9 months post-intervention
- At 6 months, the PRP demonstrated a greater return to sporting activities compared to CS
- Both LP-PRP and LR-PRP significantly reduced scores compared to CS
- Triple injections of PRP administered at weekly intervals were superior to single injections over 12 months follow-up

Burchard R,
Hufflage H,
Soost C,
Richter O,
Bouillon B,
Graw JA

[Efficiency of Platelet-Rich Plasma Therapy in Knee Osteoarthritis Does Not Depend on Level of Cartilage Damage.](#) *J Orthop Surg Res.* 2019;14(1):153. doi: 10.1186/s13018-019-1203-0

- n=59 subjects received intra-articular ACP injections once a week for 3 weeks
- Whole Organ MRI Scoring (WORMS) evaluated level of knee osteoarthritis by 14 features
- Pain symptoms and severity of clinical OA symptoms decreased
- Regression analysis did not detect a correlation between degree of cartilage damaged and positive response to ACP therapy

Cole BJ,
Karas V,
Hussey K,
Merkow DB,
Pilz K,
Fortier LA

[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.](#) *Am J Sports Med.* 2017;45(2):339-346. doi: 10.1177/0363546516665809

- Comparison of HA versus ACP intra-articular injection in subjects with mild to moderate OA
- n=49 ACP; n=50 HA
- No difference between WOMAC score of HA and ACP at any time point up to 12 month follow-up
- Significant improvements observed in IKDC for ACP compared to HA at 24 and 52 week follow-up

Smith PA

[Intra-Articular Autologous Conditioned Plasma Injections Provide Safe and Efficacious Treatment for Knee Osteoarthritis: An FDA-Sanctioned, Randomized, Double-Blind, Placebo-Controlled Clinical Trial.](#) *Am J Sports Med.* 2016 Apr;44(4):884-91. doi: 10.1177/0363546515624678

- Randomized, double-blind, placebo-controlled clinical study comparing leukocyte-poor autologous conditioned plasma (ACP) versus saline placebo
- n=30 subjects (n=15 ACP; n=15 control)
- 3 injections weekly
- At 12 month follow-up, subjects who received ACP treatment improved baseline WOMAC score by 78%, compared to 7% improvement in placebo group



Li Y,
Li T,
Li J,
Tang X,
Li R,
Xiong Y

Rotator Cuff Repair

[Platelet-Rich Plasma Has Better Results for Retear Rate, Pain, and Outcome Than Platelet-Rich Fibrin After Rotator Cuff Repair: A Systematic Review and Meta-Analysis of Randomized Controlled Trials.](#) *Arthroscopy* 2022 Feb;38(2):539-550. doi: 10.1016/j.arthro.2021.05.023

- 16 RCTs: comparing n=498 PRP to n=504 control
- PRP showed significantly decreased rates of retear, Constant score, UCLA score, ASES score and VAS score
- Sub analysis: Significant difference in retear rate was only found for long-term follow-up (≥ 24 months) and not for short-term follow-up

Zhao D,
Han Y,
Pan J,
et al

[The Clinical Efficacy of Leukocyte-Poor Platelet-Rich Plasma in Arthroscopic Rotator Cuff Repair: A Meta-Analysis of Randomized Controlled Trials.](#) *J Shoulder Elbow Surg.* 2021 Apr;30(4):918-928. doi: 10.1016/j.jse.2020.10.014

- Meta-analysis of 10 RCTs: n=372 leucocyte-poor PRP vs n=370 control
- Reduced retear rate for the PRP group in mid- and long-term follow-up yet no significance for short-term follow-up (≤ 6 months)
- Leukocyte-poor PRP performed better in relieving postoperative pain, yet the changes in the MD in VAS score were below the minimal clinically important difference (MCID). Same for the Constant score and UCLA score
- No significant difference was detected for the ASES and Oxford Shoulder Score

Hurley ET,
Colasanti CA,
Anil U,
et al

[The Effect of Platelet-Rich Plasma Leukocyte Concentration on Arthroscopic Rotator Cuff Repair.](#) *Am J Sports Med.* 2021 Jul;49(9):2528-2535. doi: 10.1177/0363546520975435

- Network meta-analysis of 13 RCTs (n=433 PRP, n=435 control). 9 studies comparing leukocyte-poor-PRP vs control; 4 studies comparing leukocyte-rich-PRP vs control
- Compared to control, LP-PRP resulted in a significantly lower retear and/or incomplete tendon healing rate, improved outcomes on the VAS for pain, Constant score, and UCLA score
- Compared to control, LR-PRP only showed improvement in VAS for pain
- Post-hoc analysis: No significant improvement of LP- over LR-PRP found

Werthel JD,
Pelissier A,
Massin P,
Boyer P,
Valenti P

[Arthroscopic Double-Row Cuff Repair With Suture-Bridging and Autologous Conditioned Plasma Injection: Functional and Structural Results.](#) *Int J Shoulder Surg.* 2014 Oct;8(4):101-6. doi: 10.4103/0973-6042.145232

- Prospective cohort: n=33 ACP (1 injection) vs n=32 control (no ACP injection)
- At mean follow-up of 19 months: No significant difference between groups for Constant-Murley score, SST, level of satisfaction or healing noted
- VAS was significantly lower in the ACP group compared to control
- In both groups, RCR with suture bridging gave successful functional outcomes, with a low rate of iterative tear



Niemiec P,
Szyluk K,
Jarosz A,
Iwanicki T,
Balcerzyk A

Tendinosis of the Elbow / Lateral Epicondylitis

Effectiveness of Platelet-Rich Plasma for Lateral Epicondylitis: A Systematic Review and Meta-Analysis Based on Achievement of Minimal Clinically Important Difference. *Orthop J Sports Med.* 2022 Apr 8;10(4):23259671221086920. doi: 10.1177/23259671221086920.

- Meta-analysis of 26 studies with 684 patients at baseline with maximum follow-up of 2 years
- The PROMs (VAS, DASH, MAYO, PRTEE) improved significantly from baseline to almost every follow-up time (4, 12, 24, 52, and 104 weeks)
- The MCID for each of the PROMs was exceeded at almost every follow-up
- Both the LR-PRP and LP-PRP systems were effective in the context of MCID

Jarosz A,
Szyluk K,
Iwanicka J,
et al

What Role Does PDGFA Gene Polymorphisms Play in Treating Tennis Elbow with PRP? A Prospective Cohort Study. *J. Clin. Med.* 2022 Jun; 11, 3504. <https://doi.org/10.3390/jcm11123504>

- A cohort of 107 patients (132 elbows) was prospectively followed for 2 years after 1 ACP injection (2-3 mL)
- The A allele carriers had significantly lower values of VAS (week 12), QDASH, and PRTEE (weeks 8, 12). The T allele carriers had significantly lower values of VAS (weeks 8, 12), QDASH, and PRTEE (weeks 4-12)
- The short-term (4-12 weeks) effectiveness of ACP is greater in A allele and T allele carriers
- The PDGFA gene's polymorphisms influence the effectiveness of ACP therapy in tennis elbow treatment

Niemiec P,
Szyluk K,
Balcerzyk A,
et al

Why PRP Works Only on Certain Patients With Tennis Elbow? Is PDGFB Gene a Key for PRP Therapy Effectiveness? A Prospective Cohort Study. *BMC Musculoskelet Disord.* 2021 Aug ;22(1):710. doi: 10.1186/s12891-021-04593-y

- A cohort of 107 patients (132 elbows) was prospectively followed for 1 year after 1 ACP injection (2-3 mL)
- Genetic variants of PDGFB gene were identified that had a better response to ACP injection
- PDGFB gene's polymorphisms increase the effectiveness of ACP therapy in tennis elbow treatment
- Genotyping of the gene PDGFB may be a helpful diagnostic tool while assessing patients for ACP injections

Xu Q,
Chen J,
Cheng L

Comparison of Platelet-Rich Plasma and Corticosteroids in the Management of Lateral Epicondylitis: A Meta-Analysis of Randomized Controlled Trials. *Int J Surg.* 2019 Jul;67:37-46. doi: 10.1016/j.ijisu.2019.05.003.

- Meta-analysis of 7 RCTs involving 515 patients (n=251 PRP vs n=264 corticosteroids (CS))
- At a 6-month follow-up, PRP injections were associated with superior pain reduction and elbow function improvement compared with CS
- No significant difference was observed regarding the post-injection adverse events



Miller LE,
Parrish WR,
Roides B,
Bhattacharyya S

[Efficacy of Platelet-Rich Plasma Injections for Symptomatic Tendinopathy: Systematic Review and Meta-Analysis of Randomised Injection-Controlled Trials.](#) *BMJ Open Sport Exerc Med.* 2017 Nov 6;3(1):e000237. doi: 10.1136/bmjsem-2017-000237.

- Meta-analysis of 16 RCTs in patients with symptomatic tendinopathy (majority of epicondylitis) with maximum follow-up of 1 year
- Pain severity was extracted from tools such as VAS, PRTEE, DASH, ASES
- PRP was more effective than control in reducing tendinopathy pain
- The treatment effects suggest clinically meaningful improvement in patient symptoms
- PRP injections for symptomatic tendinopathy may be more effective in women than men

Lebiedziński R,
Synder M,
Buchcic P,
Polguj M,
Grzegorzewski A,
Sibiński M

[A Randomized Study of Autologous Conditioned Plasma and Steroid Injections in the Treatment of Lateral Epicondylitis.](#) *International Orthopaedics SICOT.* 2015 Jul; 39:2199–2203. doi: 10.1007/s00264-015-2861-0

- Randomized study with 2 single-injection groups: 53 patients treated with ACP, and 46 with a steroid injection (betamethasone)
- At 6 weeks and 6 months the mean DASH score was significantly better in the betamethasone group, but at 1 year it was better in the ACP group
- Steroid injections gave more rapid improvement, but the therapeutic effect was longer lasting in the ACP group

Glanzmann MC,
Audigé L

[Platelet-Rich Plasma for Chronic Lateral Epicondylitis: Is One Injection Sufficient?](#) *Arch Orthop Trauma Surg.* 2015 Dec;135(12):1637-45. doi: 10.1007/s00402-015-2322-7

- A non-randomized study of 62 patients with chronic lateral epicondylitis. 36 patients received a single ACP injection, while 26 received either 2 or 3 ACP injections 4 and 8 weeks after the primary intervention, complemented with standardized physical therapy
- Significant local pain reduction (EQ5D-VAS), improved function in (PREE, qDASH) and quality of life (EQ5D) were observed in the patient cohort at 6 months following ACP injection
- Additional injections at 4 and 8 weeks after the primary injection did not result in significantly different patient-reported outcomes

Ford RD,
Schmitt WP,
Lineberry K,
Luce P

[A Retrospective Comparison of the Management of Recalcitrant Lateral Elbow Tendinosis: Platelet-Rich Plasma Injections versus Surgery.](#) *Hand* 2015; 10(2):285-291. doi: 10.1007/s11552-014-9717-8

- Retrospective chart review of 2 patient groups receiving 1 ACP injection of 3-5 mL (n=28) or surgical release (n=50)
- No statistical difference in measured outcomes (VAS, numbness, paresthesia, weakness) was found between the 2 treatment groups at mean follow-up of 315 days (range 99-1345) for ACP and 352 days (range 106-2757) for surgery
- ACP injections may be a reasonable alternative to surgery



[Autologous Proliferative Therapies in Recalcitrant Lateral Epicondylitis.](#) *AM J Phys Med Rehab.* 2015 Sep; 94(9):696-706. doi: 10.1097/PHM.0000000000000234

- A prospective non-randomized clinical trial with 2 groups: ACP group (n=27) received 3 ACP injections in intervals of 7 days; Laser group (n=29) received 12 laser applications with 2 sessions/week. Both groups attended standardized physical therapy
- 1 year follow up showed that from both groups together 63.5% were successfully treated with more than 30% improvement in VAS and more than 10.2 points in the DASH score
- Multivariate analysis of variance showed significant improvement in time response in VAS and DASH