Bucharest 2-4 October 2025

Do age, gender, BMI and disease duration influence the clinical outcomes in patients treated with PRP?

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Bucharest 2-4 October 2025

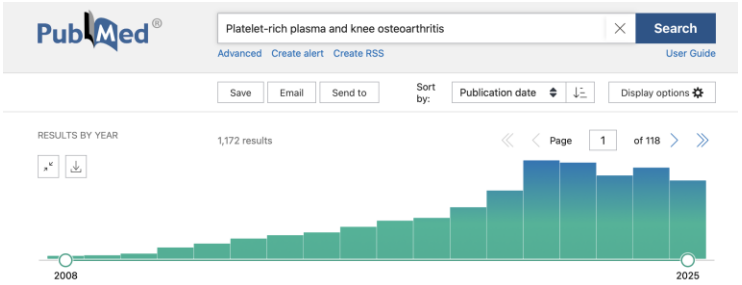
Outline

- PRP for knee OA: A brief update with a focus on limitations
- Determinants of therapeutic efficacy of PRP
- Evidence by age, gender, BMI, and disease duration/severity for PRP in knee OA
- Clinical considerations and practical recommendations

There are no conflicts of interest, nor any material or financial concerns

Expanding evidence base: PRP in osteoarthritis

- In recent years, there has been a substantial increase in the number of publications addressing the therapeutic and regenerative potential of PRP in knee osteoarthritis



- Recent systematic reviews and meta-analyses indicate that PRP can provide clinically significant improvements in pain, stiffness, and function in KOA, with effects lasting up to 6-12 months; however, evidence regarding disease-modifying effects in humans remains insufficient

Mende E, Love RJ, Young JL. A Comprehensive Summary of the Meta-Analyses and Systematic Reviews on Platelet-Rich Plasma Therapies for Knee Osteoarthritis. Mil Med. 2024;189:e2347-e2356. Bensa A, Previtali D, Sangiorgio A, Boffa A, Salerno M, Filardo G. PRP Injections for the Treatment of Knee Osteoarthritis: The Improvement Is Clinically Significant and Influenced by Platelet Concentration: A Meta-analysis of Randomized Controlled Trials. Am J Sports Med. 2025;53:745-754. Khalid S, Ali A, Deepak F, Zulfiqar MS, Malik LU, Fouzan Z, Nasr RA, Qamar M, Bhattarai P. Comparative effectiveness of intra-articular therapies in knee osteoarthritis: a meta-analysis comparing platelet-rich plasma (PRP) with other treatment modalities. Ann Med Surg (Lond). 2023;86:361-372. Qiao X, Yan L, Feng Y, Li X, Zhang K, Lv Z, Xu C, Zhao S, Liu F, Yang X, Tian Z. Efficacy and safety of corticosteroids, hyaluronic acid, and PRP and combination therapy for knee osteoarthritis: a systematic review and network meta-analysis. BMC Musculoskelet Disord. 2023;24:926. Xiong Y, Gong C, Peng X, Liu X, Su X, Tao X, Li Y, Wen Y, Li W. Efficacy and safety of platelet-rich plasma injections for the treatment of osteoarthritis: a systematic review and meta-analysis of randomized controlled trials. Front Med (Lausanne). 2023;10:1204144. Sax OC, et al. The Efficacy of Platelet-Rich Plasma for the Treatment of Knee Osteoarthritis Symptoms and Structural Changes: A Systematic Review and Meta-Analysis. J Arthroplasty. 2022;37:2282-2290.e2. Murali A, Khan I, Tiwari S. Navigating the treatment landscape: Choosing between platelet-rich plasma (PRP) and hyaluronic acid (HA) for knee osteoarthritis management-A narrative review. J. Orthop. Rep. 2024;3:100248. Liu Q, Ye H, Yang Y, Chen H. The efficacy and safety of intra-articular platelet-rich plasma versus sodium hyaluronate for the treatment of osteoarthritis: Meta-analysis. PLoS One. 2025;20:e0314878. Auroux M, et al. Efficacy of intra-articular platelet-rich plasma compared with placebo in knee osteoarthritis: A systematic review and meta-analysis. Joint Bone Spine. 2025;92:105947. Khalilizad M, Emadian ST, Marzban Abbas Abadi M. Comparative efficacy of different doses of platelet-rich plasma injection in the treatment of knee osteoarthritis: a systematic review and network meta-analysis. J Orthop Surg Res. 2025;20:221.

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8th International Symposium Intra Articular Treatment

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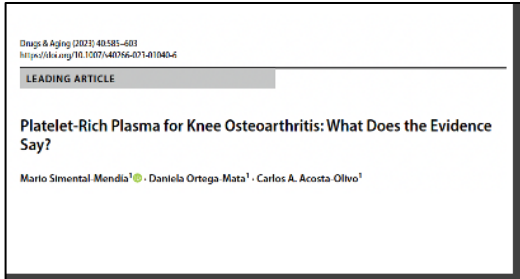


Drugs & Aging (2023) 40:583–603
https://doi.org/10.1007/s40266-023-01040-6

LEADING ARTICLE

Platelet-Rich Plasma for Knee Osteoarthritis: What Does the Evidence Say?

Mario Simental-Mendía[1] · Daniela Ortega-Mata[1] · Carlos A. Acosta-Olivo[1]

Orthopaedics & Traumatology: Surgery & Research 110 (2024) 103735

Contents lists available at ScienceDirect

Orthopaedics & Traumatology: Surgery & Research

journal homepage: www.elsevier.com

Review article

Current state of systematic reviews for platelet-rich plasma use in knee osteoarthritis

Gurjovan Sahi[a], Jin Tong Du[b], Aazad Abbas[b], Herman S. Dhotar[c,*,d]

Effect of Intra-articular Platelet-Rich Plasma vs Placebo Injection on Pain and Medial Tibial Cartilage Volume in Patients With Knee Osteoarthritis

The RESTORE Randomized Clinical Trial

Kim L. Bennell, PhD[1]; Kade L. Paterson, PhD[1]; Ben R. Metcalf, BSc[1]; et al

> Author Affiliations | Article Information

JAMA. 2021;326(20):2021-2030. doi:10.1001/jama.2021.19415

Dória et al. BMC Musculoskelet Disord (2022) 23:622
https://doi.org/10.1186/s12891-021-04708-7

BMC Musculoskeletal Disorders

Efficacy of platelet-rich plasma and plasma for symptomatic treatment of knee osteoarthritis: a double-blinded placebo-controlled randomized clinical trial

Murilo Dória[1*], Rosa Maria Rodrigues Pereira[1], Alexandre Galeno Branco Luz[2], Leticia Alle Deveza[1], Ricardo Manoel de Oliveira[2] and Ricardo Fuller[1]

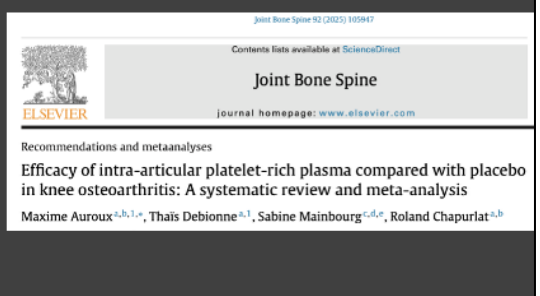
Arthroscopy: The Journal of Arthroscopic & Related Surgery

Volume 41, Issue 7, July 2025, Pages 2668-2679.e2

Systematic Review

Randomized Controlled Trials Assessing Continuous Outcomes for the Use of Platelet-Rich Plasma in Knee Osteoarthritis Are Statistically Fragile: A Systematic Review

Darius L. Lameire M.D.[a], Hassaan Abdel Khalik M.D., M.M.I.[b], Praveen Srithoran M.D.[a], Varun Jain B.H.Sc.[b], Alan Cheng B.H.Sc.[c], Moin Khan M.D., M.Sc.[b], Jaskarndip Chahal M.D., M.Sc., M.B.A.[a,d,e]



Joint Bone Spine 92 (2025) 105947

Contents lists available at ScienceDirect

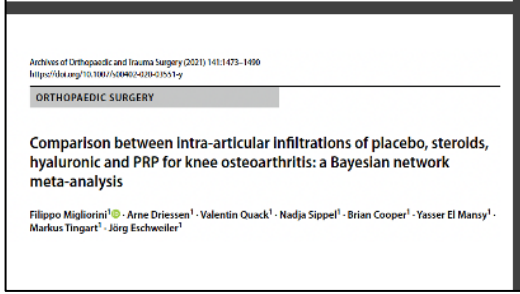
Joint Bone Spine

journal homepage: www.elsevier.com

Recommendations and metaanalyses

Efficacy of intra-articular platelet-rich plasma compared with placebo in knee osteoarthritis: A systematic review and meta-analysis

Maxime Auroux[a,b,1,*], Thaïs Debionne[a,1], Sabine Mainbourg[c,d,e], Roland Chapurlat[a,b]



Archives of Orthopaedic and Trauma Surgery (2021) 141:1473–1490
https://doi.org/10.1007/s00402-020-03551-y

ORTHOPAEDIC SURGERY

Comparison between intra-articular infiltrations of placebo, steroids, hyaluronic and PRP for knee osteoarthritis: a Bayesian network meta-analysis

Filippo Migliorini[1] · Arne Driessen[1] · Valentin Quack[1] · Nadja Sippel[1] · Brian Cooper[1] · Yasser El Mansy[1] · Markus Tingart[1] · Jörg Eschweiler[1]

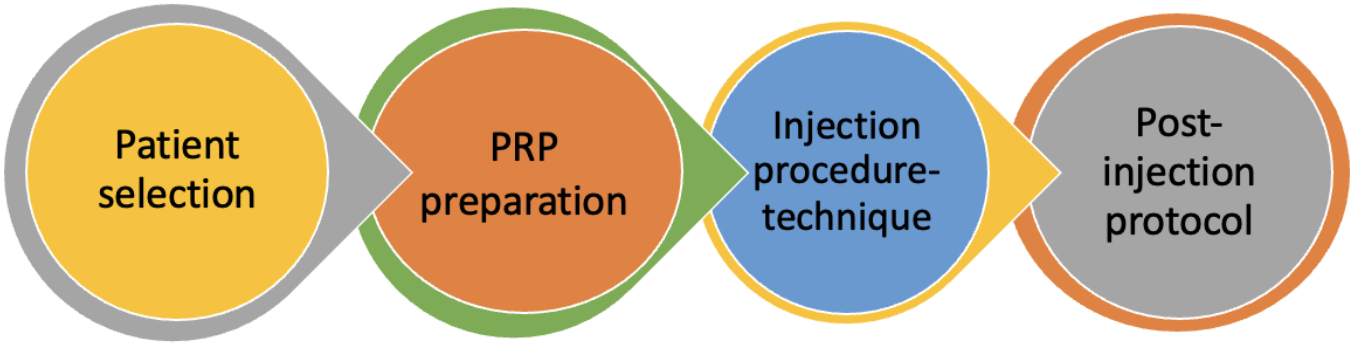
PRP?

Guidelines	Recommendation for PRP in KOA
ACR, 2019	Not recommended
OARSI, 2019	Uncertain
NICE, 2019	Special arrangements only
GRIIP, 2020	Recommended as a second-line treatment
VA/DoD, 2020	Not recommended
AAOS, 2021	Inconclusive
AOSSM, 2022	Promising option
ESSKA-ORBIT, 2024	Recommended (early OA)
ESSKA-ICRS, 2024	Recommended (post-failure conservative/injective)
ISAKOS, 2025	Observational data

- Major clinical guidelines advise caution in routine use of PRP injections for knee OA
- Recent European and international expert groups have begun to adopted more favorable perspectives, suggesting PRP may be appropriate in selected patients

Glinkowski WM, et al. Platelet-Rich Plasma for Knee Osteoarthritis: A Comprehensive Narrative Review of the Mechanisms, Preparation Protocols, and Clinical Evidence. J Clin Med. 2025;14:3983.

Beyond PRP: Key factors for success



Unresolved questions in PRP therapy: Who really benefits from PRP?

Patient selection is heterogeneous, and it remains unclear which groups benefit most from PRP; given variability in patient populations and the multifactorial nature of knee OA

Clinical factors

Age, gender, BMI

Disease severity

Symptom duration

Symtom severity

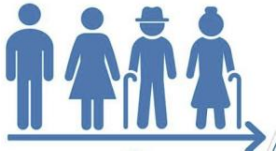
Compliance and expectations

Diagnostic considerations

Indications & contraindications

Previous treatments

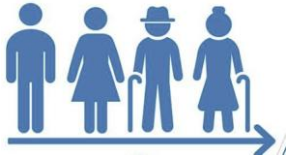
Accurate diagnosis (different structural phenotypes, local joint characteristics)



Clinical impact of age on PRP efficacy

- Younger patients generally respond better to PRP, likely due to greater repair capacity and less cartilage degeneration
- Older patients (>60-65 years) tend to show poorer outcomes and shorter therapeutic benefit; most studies report a negative correlation between age and improvement in pain and function
- Age is one of the most consistently reported predictors of PRP response, with younger patients achieving more favorable results; however, the decision should not be based only on chronologic age

Shen L, et al. The temporal effect of platelet-rich plasma on pain and physical function in the treatment of knee osteoarthritis: systematic review and meta-analysis of randomized controlled trials. J Orthop Surg Res. 2017;12:16. Kon E, et al. Platelet-rich plasma intra-articular injection versus hyaluronic acid viscosupplementation as treatments for cartilage pathology: from early degeneration to osteoarthritis. Arthroscopy. 2011;27:1490-501. Filardo G, et al. Platelet-rich plasma intra-articular injections for cartilage degeneration and osteoarthritis: single-versus double-spinning approach. Knee Surg Sports Traumatol Arthrosc 2012; 20: 2082–2091. Jang SJ, et al. PRP injections as an effective treatment for early osteoarthritis. Eur J Orthop Surg Traumatol. 2013;23:573-80. Alessio-Mazzola M, et al Clinical outcome and risk factor predictive for failure of autologous PRP injections for low-to-moderate knee osteoarthritis. J Orthop Surg (Hong Kong). 2021;29:23094990211021922. Saita Y, et al. Platelet-rich plasma therapy for knee osteoarthritis: Insights from real-world clinical data in Japan. Regen Ther. 2025;29:427-434. Kamada K, et al. Factors affecting the therapeutic effects of multiple intra-articular injections of platelet-rich-plasma for knee osteoarthritis. Asia Pac J Sports Med Arthrosc Rehabil Technol. 2024;38:43-48. Sánchez M, et al. Real-world evidence to assess the effectiveness of platelet-rich plasma in the treatment of knee degenerative pathology: a prospective observational study. Ther Adv Musculoskelet Dis. 2022;14:1759720X221100304. Kon E, et al. Platelet-rich plasma injections for the management of knee osteoarthritis: The ESSKA-ICRS consensus. Recommendations using the RAND/UCLA appropriateness method for different clinical scenarios. Knee Surg Sports Traumatol Arthrosc. 2024;32:2938-2949. Laver L,; ESSKA-ORBIT Group. The use of injectable orthobiologics for knee osteoarthritis: A European ESSKA-ORBIT consensus. Part 1-Blood-derived products. Knee Surg Sports Traumatol Arthrosc. 2024;32:783-797.



Aging and its effect on PRP composition

- Advancing age is associated with reduced growth factor content, a catabolic chondrocyte response, and macrophage-driven inflammation
- Negative correlation observed between age and serum IGF-1 levels
- Younger patients had higher platelet concentrations in both blood and PRP
- Each decade of aging reduces platelet yield in PRP by ~32,666; final PRP composition is strongly influenced by patient age and baseline platelet count
- PRP from young donors induces a more youthful chondrocyte phenotype with higher type II collagen and SOX-9 expression, while this effect is blunted in PRP from aged donors

Evanson JR, et al. Gender and age differences in growth factor concentrations from platelet-rich plasma in adults. Mil Med. 2014;179:799-805. O'Donnell C, et al. Platelet-Rich Plasma From Older Males With Knee Osteoarthritis Depresses Chondrocyte Metabolism and Upregulates Inflammation. J Orthop Res. 2019;37:1760-1770. Xiong G, et al. Men and Women Differ in the Biochemical Composition of Platelet-Rich Plasma. Am J Sports Med. 2018;46:409-419. Wiciński M, et al. The Influence of Body Mass Index on Growth Factor Composition in the Platelet-Rich Plasma in Patients with Knee Osteoarthritis. Int J Environ Res Public Health. 2022;20:40. Rossi L, et al. Substantial Variability in Platelet-Rich Plasma Composition Is Based on Patient Age and Baseline Platelet Count. Arthrosc Sports Med Rehabil. 2023;5:e853-e858. Chowdhary K, et al. Aging Affects the Efficacy of Platelet-Rich Plasma Treatment for Osteoarthritis. Am J Phys Med Rehabil. 2023;102:597-604. García-Bordes L, et al. Demographic, anthropometric and intrasubject variations affect platelet-rich plasma formulation. J Exp Orthop. 2025;12:e70024.

Do gender differences affect PRP outcomes?

- Multiple randomized trials and meta-analyses report no significant difference in PRP efficacy between males and females, despite the higher proportion of female participants in most studies
- Both men and women demonstrate comparable improvements in WOMAC and VAS scores following PRP therapy
- Final platelet concentrations are similar between genders; thus, clinical impact of gender appears limited

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;44:884e891. Cerza F, et al. Comparison between hyaluronic acid and platelet-rich plasma, intra-articular infiltration in the treatment of gonarthrosis. Am J Sports Med. 2012;40:2822e2827. Raeissadat SA, et al. Knee osteoarthritis injection choices: platelet-rich plasma (PRP) versus hyaluronic acid (a one-year randomized clinical trial). Clin Med Insights Arthritis Musculoskelet Disord. 2015;8:1e8. Migliorini F, et al. Comparison between intra-articular infiltrations of placebo, steroids, hyaluronic and PRP for knee osteoarthritis: a Bayesian network meta-analysis. Arch Orthop Trauma Surg. 2021;141: 1473e1490. Evanson JR, et al. Gender and age differences in growth factor concentrations from platelet-rich plasma in adults. Mil Med. 2014;179:799-805. Gupta P, et al. Evaluating the Efficacy of Platelet-Rich Plasma in Treating Primary Knee Osteoarthritis: A Prospective Interventional Study. Cureus. 2024;16:e71415. García-Bordes L, et al. Demographic, anthropometric and intrasubject variations affect platelet-rich plasma formulation. J Exp Orthop. 2025;12:e70024.

Gender differences in pain perception and reporting

- Some studies observed that female patients present with higher baseline VAS scores and lower WOMAC scores, although these differences were mostly not statistically significant
- Gender-related psychological factors - such as self-efficacy, pain catastrophizing, and depression - may partially explain differences in pain perception and functional reporting
- Many trials included disproportionately higher number of women, which may have influenced subgroup analyses

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;44:884e891. Cerza F, et al. Comparison between hyaluronic acid and platelet-rich plasma, intra-articular infiltration in the treatment of gonarthrosis. Am J Sports Med. 2012;40:2822e2827. Raeissadat SA, et al. Knee osteoarthritis injection choices: platelet-rich plasma (PRP) versus hyaluronic acid (a one-year randomized clinical trial). Clin Med Insights Arthritis Musculoskelet Disord. 2015;8:1e8. Migliorini F, et al. Comparison between intra-articular infiltrations of placebo, steroids, hyaluronic and PRP for knee osteoarthritis: a Bayesian network meta-analysis. Arch Orthop Trauma Surg. 2021;141: 1473e1490. Evanson JR, et al. Gender and age differences in growth factor concentrations from platelet-rich plasma in adults. Mil Med. 2014;179:799-805. Gupta P, et al. Evaluating the Efficacy of Platelet-Rich Plasma in Treating Primary Knee Osteoarthritis: A Prospective Interventional Study. Cureus. 2024;16:e71415.

Do women show a positive response to PRP?

- 418 patients (529 knees); 3 weekly LP-PRP injections; KOOS and SF-12 at baseline and 6 months; Success: ≥9.3 reduction in pain
- Significant improvement in KOOS and SF-12
- MCII achieved in 59.6% women vs 50.9% men
- Women had worse baseline pain and QoL scores

Despite worse baseline status, women showed greater improvement, leading to comparable outcomes between genders at follow-up

Sánchez M, et al. Women show a positive response to platelet-rich plasma despite presenting more painful knee osteoarthritis than men. Knee Surg Sports Traumatol Arthrosc. 2024;32:2516-2525.

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Clinical impact of BMI on PRP efficacy

- Patients with lower BMI achieve greater improvements in WOMAC and VAS scores, with more durable therapeutic benefits
- Obese patients also benefit from PRP therapy; however, the effects tend to diminish more rapidly over time

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. Am J Sports Med. 2017;45:339-346. Filardo G, et al. Leukocyte-poor PRP application for the treatment of knee osteoarthritis. Joints 2013;1:112-120. Filardo G, et al. Leukocyte-poor PRP application for the treatment of knee osteoarthritis. Joints. 2014;1:112e120. Sánchez M, et al. Real-world evidence to assess the effectiveness of platelet-rich plasma in the treatment of knee degenerative pathology: a prospective observational study. Ther Adv Musculoskelet Dis. 2022;14:1759720X221100304. Alessio-Mazzola M, et al Clinical outcome and risk factor predictive for failure of autologous PRP injections for low-to-moderate knee osteoarthritis. J Orthop Surg. 2021;29:23094990211021922. Saita Y, et al. Platelet-rich plasma therapy for knee osteoarthritis: Insights from real-world clinical data in Japan. Regen Ther. 2025;29:427-434. Gupta P, et al. Evaluating the Efficacy of Platelet-Rich Plasma in Treating Primary Knee Osteoarthritis: A Prospective Interventional Study. Cureus. 2024;16:e71415

PRP in knee OA: Obese vs non-obese?

- 91 patients with mild-moderate KOA, cohort study
- 3 intra-articular LR-PRP injections (two-week intervals)
- ROM, WOMAC, VAS at 15 days, 6 months, 12 months
- Groups: BMI ≥30 vs BMI <30
- Both obese and non-obese patients benefit from PRP
- Slight advantage for non-obese patients after 12 months
- Arthroplasty risk higher in obese KOA patients

Obese patients receive some help and benefit from the PRP injections as non-obese in short follow-up, but the effects of PRP diminish more rapidly over time in obese patients, exposing them to a higher risk for arthroplasty than non-obese patients

Annaniemi JA, et al. The Efficacy of Platelet-Rich Plasma Injection Therapy in Obese versus Non-Obese Patients with Knee Osteoarthritis: A Comparative Study. J Clin Med. 2024;13:2590.

PRP or HA for knee OA in overweight/obese patients?

- Meta-analysis, 10 RCTs, 1096 patients
- The mean BMI for each study was ≥25 kg/m^2
- During the first 0-2 months, no significant differences were found between PRP and HA
- PRP was superior to HA in WOMAC scores at 3, 6, and 12 months
- No significant difference was observed between PRP and HA at 6 months in VAS scores and at 12 months in EQ-VAS and IKDC scores

In overweight and obese KOA patients, PRP may provide superior long-term pain relief and functional improvement compared to HA, while short-term effects are similar

Luo P, et al. How to Choose Platelet-Rich Plasma or Hyaluronic Acid for the Treatment of Knee Osteoarthritis in Overweight or Obese Patients: A Meta-Analysis. Pain Res Manag. 2020 ;2020:7587936.

BMI and PRP composition

- BMI does not alter PRP growth factor composition; obese and non-obese patients show similar levels of PDGF, TGF-β, EGF, FGF-2, IGF-1, and VEGF; PRP can be used in both groups with similar effects associated with growth factors' influence on articular cartilage
- No significant differences in final platelet concentration with respect to BMI, but higher BMI correlated positively with the platelet concentration ratio, indicating proportionally greater enrichment during PRP preparation

Wiciński M, et al. The Influence of Body Mass Index on Growth Factor Composition in the Platelet-Rich Plasma in Patients with Knee Osteoarthritis. Int J Environ Res Public Health. 2022;20:40. Rossi L, et al. Substantial Variability in Platelet-Rich Plasma Composition Is Based on Patient Age and Baseline Platelet Count. Arthrosc Sports Med Rehabil. 2023;5:e853-e858. García-Bordes L, et al. Demographic, anthropometric and intrasubject variations affect platelet-rich plasma formulation. J Exp Orthop. 2025;12:e70024.

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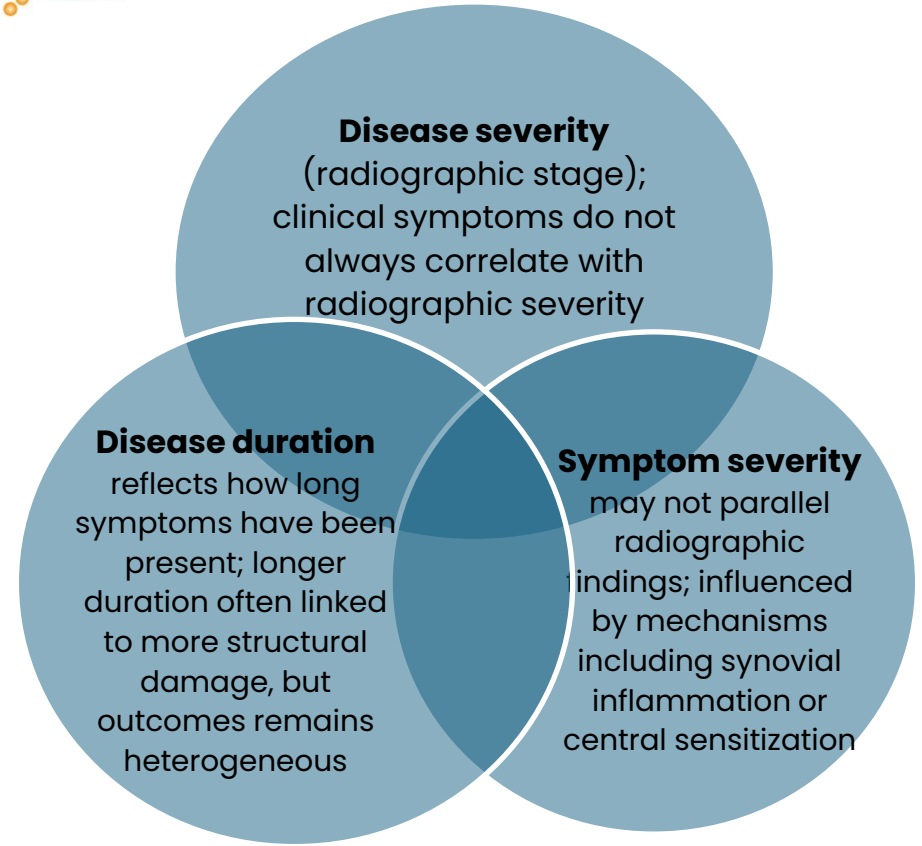
BMI as modulator of PRP response

- Lower BMI may enhance PRP effectiveness through better tissue quality, reduced mechanical stress, a stronger healing response, and improved exercise adherence
- In obese patients, mechanical overload and adipokine-mediated low-grade inflammation accelerate cartilage degeneration, potentially limiting PRP benefits
- PRP may still exert positive effects by counteracting obesity-related cytokines (IL-1, IL-6, TNF-α) and enhancing chondrocyte proliferation
- PRP can be used in obese patients, but outcomes are less durable, requiring careful counseling, long-term monitoring, and the use of US guidance

Gupta P, et al. Evaluating the Efficacy of Platelet-Rich Plasma in Treating Primary Knee Osteoarthritis: A Prospective Interventional Study. Cureus. 2024;16:e71415. Molnar V, et al. Cytokines and Chemokines Involved in Osteoarthritis Pathogenesis. Int J Mol Sci. 2021;22:9208. Shen J, et al. Inflammation and epigenetic regulation in osteoarthritis. Connect Tissue Res. 2017;58:49-63. Szwedowski D, et al. The effect of platelet-rich plasma on the intra-articular microenvironment in knee osteoarthritis. Int J Mol Sci 2021;22:5492. Annaniemi JA, et al. The Efficacy of Platelet-Rich Plasma Injection Therapy in Obese versus Non-Obese Patients with Knee Osteoarthritis: A Comparative Study. J Clin Med. 2024;13:2590.

Disease-related variables influencing PRP outcomes

- Disease severity, disease duration, and symptom severity represent distinct yet interrelated dimensions
- These variables are not always correlated with each other



PRP and disease severity

- Patients with a lower degree of joint degeneration respond best to PRP, with significant improvements in pain and function
- Mild/modarate OA patients achieve more durable and favorable outcomes
- PRP is generally more effective in early disease stages

Filardo G, et al. Leukocyte-poor PRP application for the treatment of knee osteoarthritis. Joints. 2014;1:112-20. Kon E, et al. Platelet-rich plasma: intra-articular knee injections produced favorable results on degenerative cartilage lesions. Knee Surg Sports Traumatol Arthrosc. 2010;18:472-9. Kon E, et al. Platelet-rich plasma intra-articular injection versus hyaluronic acid viscosupplementation as treatments for cartilage pathology: from early degeneration to osteoarthritis. Arthroscopy. 2011;27:1490-501. 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. Am J Sports Med. 2017;45:339-346. Sánchez M, et al. Real-world evidence to assess the effectiveness of platelet-rich plasma in the treatment of knee degenerative pathology: a prospective observational study. Ther Adv Musculoskelet Dis. 2022;14:1759720X221100304. Alessio-Mazzola M, et al Clinical outcome and risk factor predictive for failure of autologous PRP injections for low-to-moderate knee osteoarthritis. J Orthop Surg. 2021;29:23094990211021922.

PRP efficacy across KL grades

- Better results in grade I vs. grade III; no difference between other grades
- Greater efficacy in patients with grade I-II vs. grade III-IV
- Best benefits in grade II–III
- No difference among grades I–III
- Included grade II & III; outcomes improved significantly in both; no difference between grades

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. Am J Sports Med. 2017;45:339e346. Gupta P, et al. Evaluating the Efficacy of Platelet-Rich Plasma in Treating Primary Knee Osteoarthritis: A Prospective Interventional Study. Cureus. 2024;16:e71415. Cao Y, et al. A model-based quantitative analysis of efficacy and associated factors of platelet rich plasma treatment for osteoarthritis. Int J Surg. 2023;109:1742-1752. 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 Muscoskel Disord. 2021;22:550. Cerza F, et al. Comparison between hyaluronic acid and platelet-rich plasma, intra-articular infiltration in the treatment of gonarthrosis. Am J Sports Med. 2012;40:2822e2827. Saraf A, et al. Serial platelet-rich plasma intra-articular injections in kellgren and lawrence grade IV knee joint osteoarthritis: a prospective blinded placebo-controlled interventional study. Indian J Orthop. 2022;56:1722e1728.

Is PRP effective in advanced OA?

- PRP is often applied as a “salvage procedure” in advanced OA; may be considered in selected severe cases; but outcomes consistently poorer compared to earlier stages
- KL grade IV patients achieve modest short-term improvements, with results influenced by other factors
- More than three times PRP may provide some pain relief in advanced OA
- The use of PRP is recommended primarily in mild and moderate OA, while it is not considered appropriate for severe OA

Filardo G, et al. Leukocyte-poor PRP application for the treatment of knee osteoarthritis. Joints. 2014;1:112-20. Saita Y, et al. Platelet-rich plasma therapy for knee osteoarthritis: Insights from real-world clinical data in Japan. Regen Ther. 2025;29:427-34. Saraf A, et al Serial Platelet-Rich Plasma Intra-articular Injections in Kellgren and Lawrence Grade IV Knee Joint Osteoarthritis: A Prospective Blinded Placebo-Controlled Interventional Study. Indian J Orthop. 2022;56:1722-1728. Vilchez-Cavazos F, et al. The use of platelet-rich plasma in studies with early knee osteoarthritis versus advanced stages of the disease: a systematic review and meta-analysis of 31 randomized clinical trials. Arch Orthop Trauma Surg. 2023;143:1393-1408. Kamada K, et al. Factors affecting the therapeutic effects of multiple intra-articular injections of platelet-rich-plasma for knee osteoarthritis. Asia Pac J Sports Med Arthrosc Rehabil Technol. 2024;38:43-48. Kon E, et al. Platelet-rich plasma injections for the management of knee osteoarthritis: The ESSKA-ICRS consensus. Recommendations using the RAND/UCLA appropriateness method for different clinical scenarios. Knee Surg Sports Traumatol Arthrosc. 2024;32:2938-2949. Laver L,; ESSKA-ORBIT Group. The use of injectable orthobiologics for knee osteoarthritis: A European ESSKA-ORBIT consensus. Part 1-Blood-derived products. Knee Surg Sports Traumatol Arthrosc. 2024;32:783-797.

Disease duration & symptom severity

- Shorter disease duration (< 6-12 months) is associated with better PRP outcomes, with greater improvements in pain and function
- Higher baseline pain scores may predict a stronger response to PRP
- There is a discordance between clinical and radiographic KOA: some knees remain stable for years while others progress rapidly, and patients may have severe pain in early stages whereas symptoms can be minor in advanced disease

Cao Y, et al. A model-based quantitative analysis of efficacy and associated factors of platelet rich plasma treatment for osteoarthritis. Int J Surg. 2023;109:1742-1752. Kamada K, et al. Factors affecting the therapeutic effects of multiple intra-articular injections of platelet-rich-plasma for knee osteoarthritis. Asia Pac J Sports Med Arthrosc Rehabil Technol. 2024;38:43-48. Rodríguez-Merchán EC. Intra-Articular Platelet-Rich Plasma Injections in Knee Osteoarthritis: A Review of Their Current Molecular Mechanisms of Action and Their Degree of Efficacy. Int J Mol Sci. 2022;23:1301. Glinkowski WM, et al. Platelet-Rich Plasma for Knee Osteoarthritis: A Comprehensive Narrative Review of the Mechanisms, Preparation Protocols, and Clinical Evidence. J Clin Med. 2025;14:3983.

Do age, gender, BMI, and disease duration affect PRP outcomes?

- 65 patients with KL grade II–III were divided into subgroups
- Age: young <45, middle age 45-60, elderly >60; BMI (kg/m^2): <25, 25-30, >30; disease duration: less or more than 1 year symptom duration
- Serial PRP injections significantly improve VAS and WOMAC scores up to 9 months
- Outcomes were not significantly affected by age, gender, or BMI
- Disease duration emerged as a key predictor: Patients with symptom duration <1 year had significantly better outcomes at 6 and 9 months compared to those with >1 year duration

PRP injections improve short-term pain and function in KOA regardless of age, gender, or BMI

Early intervention (<1 year disease duration) yields maximal benefit; this highlights the importance of early intervention

Saraf A, et al. Do age, gender, BMI and disease duration influence the clinical outcomes in patients of knee osteoarthritis treated with serial injections of autologous platelet rich plasma? J Clin Orthop Trauma. 2023;43:102226.

Consensus	Recommendations (regarding to age, BMI and disease severity)
GRIIP, 2020	Age, weight, and physical activity can influence the indication and outcome.; being older and overweight appears to be a factor of poor response; PRP may be considered in severe OA (KL IV) when surgery is contraindicated or declined, but benefit is lower
ESSKA–ORBIT, 2024	Most studies: mean age 55–65; no specific age restrictions, but response decreases with age; other factors should guide decision. PRP mainly indicated in mild–moderate KOA (KL ≤ III); may be considered in selected severe cases (if surgery not an option) with lower benefit; not recommended in asymptomatic early OA
ESSKA–ICRS, 2024	Age influenced a significant proportion of treatment indications, in patients over 80 yrs. The best evidence and consensus lie in the 50–65 age group. PRP appropriate in ≤80 yrs with KL 0–III after failed conservative/injective treatments. Not appropriate as first-line or in KL IV.

The patient subgroups most likely to benefit

Younger age (<60-65 years): Younger patients tend to show better responses, likely attributable to greater regenerative capacity

Lower BMI (<30 kg/m²): Patients with lower BMI associated with greater and longer-lasting improvement

Shorter disease duration (<1 year): Patients with shorter symptom durations may experience greater benefit

Mild-to-moderate KOA: Better outcomes are usually observed in KL I–III patients than in advanced stages

Decision-making for PRP administration

Patient-Related Modifiers	Disease-Related Factors	PRP-Related Factors	Application Protocols
• Patient and physician goals • Demographic factors (age, gender, BMI) • Activity level • Adherence to rehabilitation programs	• Indications • Contraindications • OA phenotype • Disease severity (KL grade) • Disease duration • Symptom severity	• PRP formulation • Platelet concentration • Preparation protocol	• Number of injections • Injection interval • Use of image guidance

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Thank you ...