PRP for Equine Musculoskeletal Applications Scientific Update

Musculoskeletal pathology causes pain with daily movement, which can inhibit function. When intra-articular soft tissues, like synovium, meniscus, and ligaments, become chronically inflamed due to injury, they can shift the musculoskeletal environment to a degradative and painful estate that eventually becomes pathologic. This chronic condition causes soft tissue to become irritated and signal as a painful joint, which leads to loss of normal function through movement. Platelet-rich plasma (PRP) is an autologous growth factor treatment that reduces inflammation, clears away cell debris and damaged tissue, and aids in tissue regeneration when leukocyte-reduced products are injected into the joint. For tendon and ligament injuries, a PRP injection containing growth factors and immune cells may induce clearing of the damaged tissue and stimulate repair. Arthrex's autologous PRP system can be used to prepare all varieties of PRP in a timely manner to allow for effective treatment at the point of care, stall side.

Joints: In Vitro

Kisiday JD, McIlwraith CW, Rodkey WG, Frisbie DD, Steadman JR

Effects of platelet-rich plasma composition on anabolic and catabolic activities in equine cartilage and meniscal explants. *Cartilage*. 2012;3(3):245-254. doi:10.1177/1947603511433181

- This study's objective was to evaluate the effects of single- and double-spin preparations of platelet-rich plasma (PRP) on anabolic and catabolic activities of cartilage and meniscal explants in vitro. The single spin was leukocyte-reduced while the double spin was leukocyte-concentrated.
- Single-spin (Arthrex ACP® double-syringe system) and double-spin PRP were prepared from equine blood and analyzed for protein content followed by stimulation of equine stifle tissue to determine the effects of the products on extracellular matrix (ECM) synthesis.
- PRP from the single-spin system had decreased platelet count and growth factors compared to the double-spin system, but single-spin PRP also had a marked decrease in leukocytes (white blood cells), while the double-spin system concentrated leukocytes.
- Single-spin PRP has a similar ECM synthesis in the cartilage and meniscus as the double-spin system, and the single-spin system also induced a decreased degradative profile compared to the double-spin system when the cartilage was place in an osteoarthritis (OA) environment.

Takeaway

The single-spin ACP system effectively mitigated the pathological OA environment in a laboratory experiment along with enhancing matrix synthesis. It is thought that the increased concentration of white blood cells in the double-spin system decreased its effectiveness, and this gives promise to the ACP Max™ system performing superior to other double-spin systems as it does not increase white blood cells.

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Riboh JC, Saltzman BM, Yanke AB, Fortier L, Cole BJ

Effect of leukocyte concentration on the efficacy of platelet-rich plasma in the treatment of knee osteoarthritis. *Am J Sports Med.* 2016;44(3):792-800. doi:10.1177/0363546515580787

- This study's objective was to review the literature in a meta-analysis to determine the efficacy.
- The analysis included 6 randomized controlled trials (level 1 evidence) and 3 prospective comparative studies (level 2 evidence) with a total of 1055 human patients.
- Leukocyte-poor and -rich PRP products were compared to hyaluronic acid injections for WOMAC and IKDC scores.
- Leukocyte poor PRP injections had superior clinical efficacy for both scoring systems when compared to leukocyte-rich and hyaluronic acid injections.

Takeaway

High-level studies of joint injections in humans show that leukocyte-poor PRP is more effective than leukocyte-rich PRP, and these results are likely to be directly translated to the equine population. The Arthrex ACP® and ACP Max™ systems will consistently provide consistent PRP formulations that are leukocyte-poor.

Tendons: In Vitro

Zhou Y, Zhang J, Wu H, Hogan MV, Wang JH

The differential effects of leukocyte-containing and pure platelet-rich plasma (PRP) on tendon stem/progenitor cells - implications of PRP application for the clinical treatment of tendon injuries. *Stem Cell Res Ther.* 2015;6(1):173. doi:10.1186/s13287-015-0172-4

- The objective of this study was to analyze the effect of leukocyte formulations of PRP on tendon cell response in an in vitro environment.
- Both leukocyte-rich and leukocyte-poor PRP preparations induced growth and proliferation of the tendon cells.
- Leukocyte-rich PRP was found to induce tendon cells to increase expression of inflammatory and catabolic proteins.
- Leukocyte-poor PRP was found to primarily induce tendon cells to produce anabolic proteins, including collagen.

Takeaway

Both PRP formulations can induce tendon cell proliferation, but each formulation may not be ideal for all tendon pathologies. These in vitro results indicate that leukocyte-rich formulations may be ideal for initial treatment of acute injuries and leukocyte poor formulations may be ideal for chronic injuries and late-stage healing of acute injuries.

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Tendons: Clinical

Georg R,
Maria C,
Gisela A,
Bianca C

Autologous conditioned plasma as therapy of tendon and ligament lesions in seven horses.
J Vet Sci. 2010;11(2):173-175. doi:10.4142/jvs.2010.11.2.173

- This study is a case report of 7 horses primarily used for sport or pleasure riding with acute flexor tendon or ligament inflammation that limited their activity.
- These patients were treated with two injections of autologous conditioned plasma (ACP) 2 weeks apart with a follow-up of 10-13 months.
- Overall, there was a trend of decreased injury zone and cross-sectional area of the injury for both tendons and ligaments.
- All 7 horses in this study returned to their previous workload or were back in full training at the end time point with no re-injury reported.

Takeaway

ACP was shown to be safe and effective in reducing tendon and ligament injury-related limitations in activity for an equine population with improvements in objective measures of injury size.

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