

PRP for Wound Healing and Reduction of Infections

Scientific Update



Infections following injury or surgical repair are associated with increased medical costs while also reducing animal outcomes and return to daily activities. Platelet-rich plasma (PRP) treatment options allow for the concentration of autologous platelets for point of care administration and have been shown to improve wound healing and aid control of wound infections as an adjunct to current antibiotic administration. Platelets, once activated, release several proteins, cytokines, and growth factors that we now know are antimicrobial, modulate inflammation, and stimulate wound healing. The Arthrex ACP® double-syringe, ACP Max™, and Angel® cPRP systems allow for consistent and controllable concentration of these platelets in a safe and timely manner while the Thrombinator™ system allows for the production of an easy-to-handle autologous fibrin gel that can be easily applied to wounds. The articles below may be useful to understand and better support clinicians use of PRP to treat wounds and potentially reduce bacterial infections of wounds.

Intravia J,
Allen DA,
Durant TJ,
et al

Antimicrobial Activity of PRP In Vitro

[In vitro evaluation of the anti-bacterial effect of two preparations of platelet rich plasma compared with cefazolin and whole blood.](#) *Muscles Ligaments Tendons J.* 2014;4(1):79-84.

- This study investigated the antibacterial properties of leukocyte-poor PRP from an ACP device, a leukocyte-rich PRP whole blood, and a control against *S aureus*, *S epidermidis*, *P acnes*, and MRSA
- Two patients' blood were tested on all bacterium and were tested in duplicate at 0, 1, 4, 8, and 24 hours on a standard bacterial time kill assay
- Both PRPs were effective at reducing colony-forming units of all bacteria tested and began to show a significant decrease from PBS and whole blood at 8 hours
- Both PRPs performed as good, or better, at reducing colony-forming units compared to cefazolin on all bacteria tested except for *P acnes*

Takeaway

While this is an in vitro study with small sample size, the article supports the use of PRP as it can reduce the replication of most key periprosthetic joint infection-causing bacteria compared to the commonly prescribed antibacterial cefazolin. The results from this study show there was no significant difference in PRP types at reducing the growth of bacteria in a laboratory setting.

[An evaluation of the bacteriostatic effect of platelet-rich plasma.](#) *Int Wound J.* 2021;18(4): 448-456. doi:10.1111/iwj.13545

- This study investigated the antimicrobial effects of unactivated PRP, activated PRP, and a negative control to kill bacteria affect colony units and biofilm growth of *S epidermidis* and *S aureus*
- PRP was prepared using the Angel® PRP system at 8% hematocrit and the activated PRP was activated with an Arthrex autologous thrombin device
- Unactivated and activated PRP both were superior to the negative control in their ability to kill bacteria and reduce colony-forming units of *S epidermidis* and *S aureus*, with activated PRP significantly superior to killing bacteria over unactivated PRP
- Biofilm concentrations increased during the study period and there was no significant difference among the treatment groups in biofilm growth

Takeaway

Activated PRP shows an increased ability to kill bacteria prior to forming colonies compared to unactivated for both *S aureus* and *S epidermidis*, but once colonies form both PRPs are equally as effective at reducing bacterial colonies. Once a biofilm has been produced by bacterial colonies from *S epidermidis* and *S aureus*, PRP becomes ineffective at reducing bacterial colonies.

Antimicrobial Activity on Canine MRSA Skin Wounds

[Antimicrobial action of autologous platelet-rich plasma on MRSA-infected skin wounds in dogs.](#) *Sci Rep.* 2019;9(1):12722. doi:10.1038/s41598-019-48657-5

- The aim of this study was to evaluate the antimicrobial effect of PRP against MRSA wound infections and to examine the acceleration of wound contraction and epithelialization after subcutaneous autologous PRP infiltration
- A 3 cm diameter wound was created and infected with MRSA for 1 week and treated with 3 weeks of leukocyte-poor PRP activated with calcium chloride
- At all three timepoints, the PRP-treated wound had an increased percentage of fibrous tissue, a decreased wound size, increased contraction percentage, and an increased epithelialization percentage
- The bacterial count in the PRP group contained ~93% less bacteria than the antibiotic group at week 1 and ~99.2% less bacteria than the antibiotic group at week 2; the bacteria was almost completely absent in the PRP group at week 3, while there was still bacteria present in the antibiotic group
- At week 3, there was a significant decrease in tumor necrosis factors and an increase of vascular growth factor being produced by the cells of the wound treated with PRP compared to the antibiotic group

Takeaway

The use of leukocyte-poor PRP accelerated wound healing of a MRSA-infected canine wound and almost completely reduced MRSA bacterial count after 3 consecutive weeks of treatment.

Iacopetti I,
Patruno M,
Melotti L,
et al

Clinical Presentation of Large Subacute Canine Wound Healing

[Autologous platelet-rich plasma enhances the healing of large cutaneous wounds in dogs.](#) *Front Vet Sci.* 2020;7:575449. doi:10.3389/fvets.2020.575449

- The aim of this study was to describe the wound management and the effects of the topical application of PRP in large (11.32-91.5 cm²) subacute skin wounds in dogs
- Following debridement, two consecutive applications of PRP were applied with the second application 15 days after the first
- Lesions became exudative within 2 weeks with a decrease in effusion while necrotic tissue became granulated; and existing infections were resolved in the three patients who began treatment with them
- The granulated tissue showed no keloid or pathological scarring and hair regrowth occurred on all new tissue growth

Takeaway

Topical application of subacute (1-2 weeks following injury) wounds can effectively be used in a two-treatment regimen, 15 days apart, to promote epithelialization and complete wound closure while potentially resolving a potential infection.

Surgical Wound Healing in Equine

[Effects of platelet-rich plasma gel on skin healing in surgical wound in horses.](#) *Acta Cir Bras.* 2009;24(4):276-281. doi:10.1590/s0102-86502009000400006

- The goal of this study was to determine the efficacy of an autologous PRP gel from autologous thrombin in surgical wound healing through sequential analysis of biopsies
- Two 8 cm full-thickness wounds were created with 6 cm space between, and biopsies were collected at either 5 and 30 days or 15 and 45 days following the wound creation
- Autologous thrombin and leukocyte-rich PRP were isolated from six adult horses and were subsequently mixed at a 2:1 ratio of PRP to thrombin to create an autologous gel and the gel was implanted subcutaneously in half the wounds
- There were no complications observed and the PRP showed enhanced epithelial development while also showing decreases in ulcerate area and necrotic debris at day 5 compared to the control
- By day 15, the PRP treatment showed more organized collagen healing compared to control and by days 30 and 45, the PRP treatment showed increased vasculature present compared to controls

Takeaway

The PRP gel showed improved healing for acute surgical wounds and may provide enhanced healing capacity in hard-to-heal patients or wound types. This supports the use of leukocyte-rich PRP with an autologous fibrin clot, but further studies are needed to investigate if leukocyte-reduced PRP with an autologous fibrin clot is as beneficial.

DeRossi R,
Coelho AC,
Mello GS,
et al



Cetinkaya RA,
Yilmaz S,
Ünlü A,
et al

Combination Treatment of PRP With Antibiotics

The efficacy of platelet-rich plasma gel in MRSA-related surgical wound infection treatment: an experimental study in an animal model. *Eur J Trauma Emerg Surg.* 2018;44(6):859-867. doi:10.1007/s00068-017-0852-0

- This study investigated the effectiveness of PRP alone and in conjunction with antibiotic treatment of MRSA in a superficial soft-tissue wound animal model
- Mice were treated with PRP and/or vancomycin following the inoculation of a 2 cm wound and wounds were analyzed 8 days following treatment
- The MRSA counts and inflammation scores were significantly decreased in the PRP and vancomycin groups, while the combination of both treatments were significantly decreased compared to either treatment alone

Takeaway

PRP and vancomycin were both able to reduce the presence of MRSA, while the combination of both treatments appears to have a synergistic effect.