Comparison of the Arthrex ACP® Double-Syringe System and RegenKit® PRP (Regen Lab)

Arthrex Research and Development

Introduction

The Arthrex ACP® double-syringe system provides rapid and efficient concentration of platelets and growth factors from platelet-rich plasma (PRP) from a small sample of blood for use at the patient's point of care. White blood cells, specifically neutrophils, are not concentrated within the ACP system. Similarly, PRP prepared using the RegenKit system claims to be 5.5 mL of a 1.6× platelet leukocyte-reduced PRP. The purpose of this testing was to compare cell and growth factor content of the PRP produced by both systems.

Methods

Six ACP double syringes were preloaded with 1.5 mL ACD-A anticoagulant and six 5 mL syringes were preloaded with 0.5 mL ACD-A anticoagulant. The RegenKit tubes already contained 1 mL sodium citrate anticoagulant. A licensed phlebotomist drew 30 mL whole blood (WB) from six donors into a 30 mL syringe that did not contain anticoagulant. This syringe was inverted to ensure a homogenous mixture and then immediately distributed as follows: 10 mL WB into the RegenKit tube (11 mL total in syringe); 13.5 mL WB into ACP syringe (15 mL total in syringe); and 4.5 mL into 5 mL syringe (5 mL total in syringe), inverting to mix anticoagulant in all.

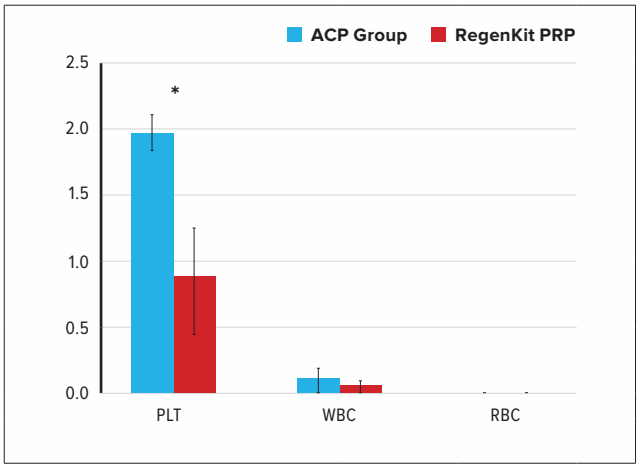
The RegenKit tube was centrifuged 1500 g for 5 minutes. After centrifugation, the tube was inverted several times to resuspend platelets, then PRP was withdrawn into a clean 10 mL syringe. Volume was recorded. ACP syringes were centrifuged at 1500 rpm for 5 minutes in a Hettich centrifuge (with brake off), and ACP product was collected into the inner syringe while care was taken to avoid disrupting PRP layer. Volume was recorded.

A portion of the PRP and WB was transferred to cryovials for complete blood count analysis (Sysmex XE-5000) and the remainder frozen ELISA. TGF-β1, PDGF-AB, and EGF were assayed per manufacturer instructions using single Quantikine® ELISA kits (R&D Systems). Data were compared using paired t-tests when normally distributed, otherwise a Wilcoxon signed rank test was used (Sigmaplot 14.0).

Results

Complete blood counts were performed on both PRP products and compared to baseline WB (Figure 1). Both systems were leukocyte- (p=0.44) and RBC- (p=0.06) reduced. The Arthrex ACP system produced 4.7 ± 0.8 mL of a 2.0× platelet PRP. RegenKit PRP was a similar volume (5.2 ± 0.5 mL, p=0.14) but was not enriched for platelets, with only 0.8× baseline on average (p<0.001).

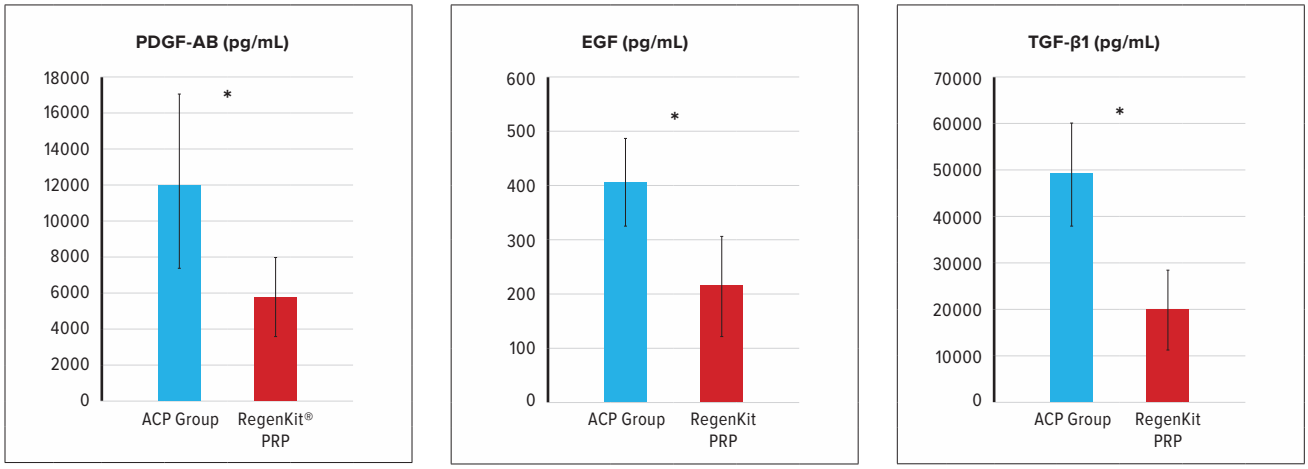
Figure 1. Fold Change of Cellular Components.



*Indicates statistical significance (p<0.05).

Growth factor content was also assessed (Figure 2). The Arthrex ACP® system had a higher concentration of PDGF-AB (p=0.031), EGF (p=0.002), and TGF-β1 (p<0.001).

Figure 2. Comparison of Growth Factor Content.



Discussion and Conclusions

Both systems produced a similar volume of product with reduced leukocytes and red blood cells. The PRP prepared in the Arthrex ACP double-syringe system contained significantly more platelets (2.0× vs 0.8×), and platelet-derived growth factors (PDGF-AB, TGF-B1, and EGF) than PRP prepared using the Regen Lab system.