Objective: To determine whether the addition of a topical anesthetic solution prior to or concurrent with platelet-rich plasma (PRP) results in platelet activation.

Background: Advances in the comprehension of the mechanisms of tissue repair and the role of growth factors have stimulated the use of platelet-rich plasma (PRP) therapies by orthopedic surgeons and sports medicine physicians. During the PRP injection procedure a local anesthetic is utilized. The present study was undertaken to determine whether the anesthetic solution activates platelets.

The most widely utilized test for the determination of platelet activation is P-selectin percentage. P-selectin an alpha-granule membrane protein is sequestered on the internal membrane of the alpha-granule in resting platelets. A freshly prepared platelet concentrate will have a P-selectin value of less than 15%. Following platelet activation and fusion of the alpha-granule with the platelet membrane an increase in the percentage of P-selectin can be detected on the platelet surface. As part of an in vitro evaluation of a platelet preparation viability one should expect a minimum of a four-fold increase in P-selectin percentage following the addition of ADP.

Methods:

1. Blood collection: Whole blood was collected in ACD-A solution.
2. PRP preparation: PRP was prepared using the SmartPReP®-2 (Harvest Technologies, Plymouth, MA).
3. A 40 mL PRP pool was prepared which provided sufficient volume for testing.
4. In vitro analyses.
   - CBC using a Coulter AcT diff2
   - P-selectin testing
5. Samples tested
   a. Baseline whole blood sample
   b. Pooled PRP samples
   c. PRP samples plus anesthetic solutions:
      5 mL plus 0.1 mL 4% Xylocaine
5 mL plus 0.2 mL 4% Xylocaine
5 mL plus 0.5 mL 4% Xylocaine
5 mL plus 0.1 mL 4% Lidocaine
5 mL plus 0.2 mL 4% Lidocaine
5 mL plus 0.5 mL 4% Lidocaine

Results: As shown in Table 1 there is no significant difference in the platelet concentration prior to and following the addition of the anesthetic solutions.

<table>
<thead>
<tr>
<th>SAMPLES TESTED</th>
<th>Platelets x10^3/μL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole blood</td>
<td>225</td>
</tr>
<tr>
<td>Pooled PRP PREP</td>
<td>1065</td>
</tr>
<tr>
<td>5 ml PRP plus 0.1 mL Xylocaine</td>
<td>1003</td>
</tr>
<tr>
<td>5 ml PRP plus 0.2 mL Xylocaine</td>
<td>983</td>
</tr>
<tr>
<td>5 ml PRP plus 0.5 mL Xylocaine</td>
<td>968</td>
</tr>
<tr>
<td>5 ml PRP plus 0.1 mL Lidocaine</td>
<td>994</td>
</tr>
<tr>
<td>5 ml PRP plus 0.2 mL Lidocaine</td>
<td>974</td>
</tr>
<tr>
<td>5 ml PRP plus 0.5 mL Lidocaine</td>
<td>941</td>
</tr>
</tbody>
</table>

TABLE 1: A comparison of the platelet concentrations of the whole blood, pooled PRP samples, and the PRP samples following the addition of commercial anesthetic solutions.

As shown in figure 1 there is a non-significant increase in P-selectin expression immediately following PRP preparation. The platelets are alive and functional as demonstrated by an increase in P-selectin percentage following the addition of ADP, equal to that demonstrated by the whole blood sample. Following the addition of the commercially available anesthetic solutions in a 1:50 to a 1:10 dilution there was no evidence of activation or loss of function as demonstrated by the low level of P-selectin expression in the resting state. Upon the addition of ADP there is a significant increase in P-selectin expression in the PRP samples containing the anesthetic solutions equal to that observed in whole blood and normal PRP preparation.
**Conclusion:** Local anesthetic solutions do not activate PRP preparations or affect their viability or concentration.