Effect of platelet-rich plasma on polypropylene meshes implanted in the rabbit vagina: histological analysis
Platelet-rich plasma injections for acute musculoskeletal injuries: do they work?

Johannes Tol
DISCLOSURE

I, Johannes Tol, or a family member(s), have relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated with or without recognition within the presentation as follows:

Grants for conducting trials on the effect of PRP in acute hamstring injuries (Arthrex) and Achilles (Biomet)
Literature: PRP use in acute MSK injuries

- Achilles tendon rupture
- Acute muscle injury
RCT acute Achilles rupture

- 2014 De Carli et al. AJSM FU 34 m
  - PRP group (n=20) 4 ml at surgery and 2 wks
  - No injection group (N=20)

- mini-open Kakiuchi
- My cells PRP

Outcome:
VISA-A, VAS, FAOS, US, MRI

Results:
No significant difference at 1, 3, 6, 24 m
RCT acute Achilles rupture

- 2011 Schepull et al. AJSM FU 6, 12 m
  - PRP group (n=12) 10 ml
  - No injection group (N=14)
  - PRP 3700 $10^9$ platelets

**Primary outcome:**
Mechanical properties (E-modulus): no significant difference

**Secondary outcomes:**
Heel-raise index: no significant difference
Achilles Tendon Total Rupture Score: PRP significantly worse
Conclusion

Best evidence synthesis:
Strong evidence against PRP in acute Achilles tendon rupture
PRP in muscle injury
Lazy rats and athletes

1: PRP in Rats, promising new stuff

2: PRP in Athletes, confusing results

3: The Athletic Rat, confusion unravelled
1. PRP in Rats: promising new stuff

Menetrey et al. *JBJS* 2000; Wright-Carpenter et al
2. PRP in Athletes: confusing results

Hines Ward Has PRP Injections Before Super Bowl!

Tennis Superstar Rafael Nadal Uses PRP Therapy
PRP works in muscle injuries??

Grassi A. et al. Is PRP effective in the treatment of acute muscle injuries? A systematic review and meta analysis
Sports Med 2018
PRP works !!! (...??)
PRP works in muscle injuries??

Grassi A. et al. Is PRP effective in the treatment of acute muscle injuries? A systematic review and meta analysis
Sports Med 2018
RCTs on PRP in muscle injury

NO EFFECT PRP
• Reurink et al. 2014
• Hamilton et al. 2015
• Martinez-Zapata et al. 2016

PLACEBO CONTROLLED

POSITIVE EFFECT PRP
• Hamid et al. 2014
• Rossi et al. 2016
• Bubnov et al. 2013

NO PLACEBO

Why Platelet Rich Plasma?

Expected increase $45 million (2009) to $126 million in 2016
Muscle re-injury
3. The Athletic Rat: confusion unravelled

Postinjury Exercise and Platelet-Rich Plasma Therapies Improve Skeletal Muscle Healing in Rats But Are Not Synergistic When Combined

Paola Contreras-Muñoz,† PhD, Joan Ramon Torrella,‡ PhD, Xavier Serres,§ MD, PhD, David Rizo-Roca,‡ PhD, Meritxell De la Varga,† PhD, Ginés Viscor,‡ PhD, Vicente Martínez-Ibáñez,‡ MD, PhD, José Luis Peiró,†‖ MD, PhD, Tero A. H. Järvinen,‡ MD, PhD, Gil Rodas,∗# MD, PhD, and Mario Marotta,∗†‡ PhD

Contreras-Munoz et al. AJSM 2017
5 groups of rats with muscle injuries

– Untreated
– Saline
– PRP
– PRP + exercise
– Exercise
Muscle Force

- Untreated
- Saline
- PRP
- PRP-Exer
- Exer

Contreras-Munoz et al. AJSM 2017

Myofiber CSA (μm²)

- Untreated
- Saline
- PRP
- PRP-Exer
- Exer

Contreras-Munoz et al. AJSM 2017
Summarizing the evidence on PRP in muscle injury
Take home message

Muscle injuries:

PRP works in lazy rats but not in athletes
PRP works in muscle injuries??

Grassi A. et al. Is PRP effective in the treatment of acute muscle injuries? A systematic review and meta analysis
Sports Med 2018
PRP works !!! (...??)
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Grassi A. et al. Is PRP effective in the treatment of acute muscle injuries? A systematic review and meta analysis
Sports Med 2018
1 injection PRP Biomet superior to physio

Strength:
Grade 2 lesions

Limitation:
Non-blinded design
3 arm RCT (N=90)
- PRP Biomet plus physio
- P Poor P plus physio
- Physio

Injection procedure
- Localization on MRI and US
- One procedure 3 injections PPP or PRP
  - < 5 days after injury
Results

90% professional athletes / 83% Football
Why Platelet Rich Plasma?

Expected increase $45 million (2009) to $126 million in 2016
Adjusted Hazard Ratio

Adjusted Hazard Ratio:

- Adj HR: PRP vs. PPP = 2.29 (95% CI 1.30 to 4.04) P=0.004
- Adj HR: Physio vs. PRP = 0.67 (95% CI 0.39 to -1.16) P=0.15
- Adj HR: Physio vs PPP = 1.57 (95% CI 0.88 to -2.80) P=0.13
- Injection procedure saline or PRP Arthrex

**2x injections:**
- < 5 days after injury
- 5-7 days later

- Standardized rehabilitation program
3 RCTs acute hamstring

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>log(Hazard Ratio)</th>
<th>SE</th>
<th>Control Total</th>
<th>PRP Total</th>
<th>Weight</th>
<th>Hazard Ratio IV, Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamid 2014</td>
<td>1.56</td>
<td>0.65</td>
<td>12</td>
<td>12</td>
<td>1.7%</td>
<td>4.76 [1.33, 17.01]</td>
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<tr>
<td>Hamilton 2015</td>
<td>0.39</td>
<td>0.27</td>
<td>27</td>
<td>28</td>
<td>9.8%</td>
<td>1.48 [0.87, 2.51]</td>
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<tr>
<td>Reurink 2014</td>
<td>-0.04</td>
<td>0.09</td>
<td>38</td>
<td>37</td>
<td>88.5%</td>
<td>0.96 [0.81, 1.15]</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td></td>
<td></td>
<td>77</td>
<td>77</td>
<td>100.0%</td>
<td><strong>1.03 [0.87, 1.22]</strong></td>
</tr>
</tbody>
</table>

Heterogeneity: Chi² = 7.92, df = 2 (P = 0.02); I² = 75%
Test for overall effect: Z = 0.35 (P = 0.73)
Re-injury
Conclusion

Strong evidence

**NOT**

to support the use of PRP injections for

Achilles tendon ruptures

hamstring injuries