EVALUATION OF TACKLING BIOMECHANICS IN RUGBY

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AIM
To set up an experimental protocol and analyse forces, movements, and muscle activity during simulated Rugby Union tackles, which are known to be one of prevailing causes for spinal/shoulder injuries [1].

METHODS
A 50 kg punch bag translated towards the tackler through a pulley system simulated the ball carrier under 3 conditions:
1) ‘stationary’ tackler, dominant side shoulder tackle (ST-DOM);
2) ‘stationary’ tackler, non-dominant side shoulder tackle (ST-NON);
3) moving tackler, dominant side shoulder tackle (MV-DOM).

15 male players (23 ± 5 years, 1.82 ± 0.06 m, 96.6 ± 12.9 kg) were tested and the variables reported in Figure 1 were measured.

RESULTS
The velocity at which the punch bag hit the tackler (v_{hor}) was comparable in the 3 conditions, but forces, trunk and head motions in MV-DOM were larger than in ST-DOM and ST-NON (Table 1). Muscle activity in each condition was characterised by a considerable pre-activation of all 8 muscles prior to impact, with the gluteus activated before all the others.

Table 1. Average ± SD of the measured variables at the impact.

<table>
<thead>
<tr>
<th>Measure</th>
<th>ST-DOM</th>
<th>ST-NON</th>
<th>MV-DOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>v_{hor} (m/s)</td>
<td>3.70 ± 0.23</td>
<td>3.61 ± 0.26</td>
<td>3.63 ± 0.29</td>
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<tr>
<td>F_{hor} (BW)</td>
<td>2.84 ± 0.71</td>
<td>2.47 ± 0.63*</td>
<td>3.43 ± 0.85**</td>
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<tr>
<td>Neck Flexion (°)</td>
<td>23.94 ± 15.17</td>
<td>25.00 ± 19.56</td>
<td>27.47 ± 16.13</td>
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<tr>
<td>Trunk flexion (°)</td>
<td>50.58 ± 9.51</td>
<td>52.50 ± 9.83</td>
<td>54.19 ± 9.17</td>
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</table>

CONCLUSION
The set-up allowed the measurement of loads, movements and neuromuscular activity during simulated tackles. These features may be useful for both coaching and for a better understanding of potential injury factors such as high-force impacts and simultaneous movements of the neck and trunk.

REFERENCES