BioRID2 seating position proposal 1

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About the posture of BioRID2

【Background】
At the 14th headrest Global Technical Regulation Informal conference held in September, 2013,
①head angle tolerance inclining forward +3.5 degree- backward tilting- 0.5 degree or ± 1degree
②pelvis initial angle 26.5-degree or design Torso +1.5 degrees
③though the dynamic testing possible torso angle 20-30 degrees or other angle were discussed. But It did not become a conclusion.

【Purpose】
JAMA propose to GTR7IG about seating position.
1-1】 Changing injury value by angle of head and pelvis

Seat Condition
Torso angle 21 degrees (seatback UR 0-5step)
Tested with GTR7-ph2 latest (R-point & adjust rear head position way)

Dynamic sled test menu

<table>
<thead>
<tr>
<th>degree</th>
<th>Head angle</th>
<th>Pelvis angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>test1</td>
<td>0</td>
<td>22.5 (design torso+1.5)</td>
</tr>
<tr>
<td>test2</td>
<td>5 forward tilt</td>
<td>22.5</td>
</tr>
<tr>
<td>test3</td>
<td>0</td>
<td>26.5</td>
</tr>
</tbody>
</table>
【1-2】Changing injury value by angle of head and pelvis

### Injure value change %( test1 is 100%)

<table>
<thead>
<tr>
<th>NIC</th>
<th>UPMy+</th>
<th>UPMy-</th>
<th>LoFx</th>
<th>LoMy+</th>
<th>LoMy-</th>
<th>NDCrot</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>98.2</td>
<td>98.3</td>
<td>148.20</td>
</tr>
</tbody>
</table>

UPFx is erased because the value is mini then the ratio grew too much. NDCrot was measured by angle velocity sensor.

〈Head forward tilt 5deg〉

UPMy+ has increased 48% from head 0 to 5 degree. 10% a degree of changing.

**So Head angle ± 1 degree tolerance is better.**

There is opinion that sensitive criteria should not use.

The head backward tilt test was tried, but the head angle return to 0 degree, so JAMA was not able to do the test.

〈Pelvis 26.5〉

The change of the injury value was little (within 10%).

**Both the design torso +1.5 degree and 26.5 degree pelvis angle are acceptable.**
**Torso21**

Green area means possible to install dummy. **Both of 22.5 and 26.5 deg are OK.**

**Torso19**

Yellow No area needs pushing pelvis rearward. 20.5 deg is possible but **26.5 is better.**

**Torso17**

Green area is very narrow. **Difficult to keep head angle ± 1 deg.**
【Result】 Hip point height
JAMA has checked Hip point height.

Design Hip point Z is 248mm, 3DM measured Hip point is 249mm. It’s very close.

<Result> Hip point Z came off -10mm in under 24 degree of pelvis angle. Over 24 degree, it was in ±10mm tolerance.

<JAMA propose >.
The pelvis angle is 26.5 ± 2.5 degree in any torso angle test.

But Hip point Z at pelvis 24 degree is -10mm, so we should care in case of come off tolerance.
JAMA investigated JNCAP BioRID-II Hip point positioning tolerance data

Design HP 0mm to 3DM HP(withHRMD)

3DM HP(withHRMD) to BioRID-II HP

JNCAP data says Hip point Z come off ±10mm.

< JAMA propose >
if come off 10mm tolerance, try dummy seating again, if come off 3 times, use 3rd dummy Hip point.
<table>
<thead>
<tr>
<th></th>
<th>JAMA Propose</th>
<th>Supplementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head angle</td>
<td><strong>Continue study</strong></td>
<td></td>
</tr>
<tr>
<td>Pelvis angle</td>
<td>26.5±2.5 degree</td>
<td></td>
</tr>
<tr>
<td>Hip point Z</td>
<td>±10mm.</td>
<td>if come off 3 times, use 3rd dummy position.</td>
</tr>
<tr>
<td>Test torso angle</td>
<td><strong>Continue study</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a seat back angle of 20° (torso angle) is really borderline for getting the head leveled. It depends on the seat type.</td>
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</table>
Thank you