Ocular Outcomes Comparison Between 14- and 70-day Head-down Tilt Bed Rest

R.L. Cromwell,1 G. Taibbi,2 S. B. Zanello,1 P.O. Yarbough,1 R.J. Ploutz-Snyder,1 and G. Vizzeri2

1 Universities Space Research Association, Division of Space Life Sciences, Houston, TX  2 Department of Ophthalmology and Visual Sciences, The University of Texas Medical Branch, Galveston, TX

BACKGROUND

• Ophthalmological changes have been recently reported in some astronauts involved in long-duration space missions:
  - Elevated intracranial pressure resulting from μG-induced cephalad fluid shifts may be responsible for most of these findings
  - Head-down tilt bed rest (HDTBR) produces cephalad fluid shifts; used to simulate the effects of μG on the human body

METHODS

• Experimental protocols:
  - 14-day HDTBR
  - 70-day HDTBR

RESULTS

<table>
<thead>
<tr>
<th></th>
<th>14-day HDTBR</th>
<th>70-day HDTBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>37.75 (8.78)</td>
<td>39.5 (7.3)</td>
</tr>
<tr>
<td>Gender (Male/Female)</td>
<td>12/4</td>
<td>5/1</td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian/African-American</td>
<td>10/5</td>
<td>3/1</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

• Pre/post-HDTBR differences in near visual acuity, spherical equivalent, IOP and SD-OCT average RNFL thickness were compared between the two studies

CONCLUSIONS

• There were no significant pre/post-HDTBR differences between 14- and 70-day HDTBR for the structural and functional ophthalmological variables evaluated
• Further HDTBR studies with different duration and/or angle of tilt and/or environmental conditions (e.g., high CO2 exposure during HDTBR) may help determine the validity of the HDTBR analog to investigate microgravity-induced ophthalmological changes

SUPPORT

NASA Flight Analogs Project, 516724.03.04.01
NIH/NCAT 1UL1RR029876-01

DISCLOSURE

Cromwell, RL; Taibbi, G; Zanello, SB; Yarbough, PO; Ploutz-Snyder, RJ; Vizzeri, G
ronita.l.cromwell@nasa.gov