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

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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

PURPOSE

- To compare structural and functional ocular outcomes between 14- and 70-day HDTBR in healthy human subjects.
- Hypothesis: 70-day HDTBR induces ocular changes of greater magnitude as compared to 14-day HDTBR

METHODS

- Two integrated, multidisciplinary studies conducted at NASA Flight Analogs Research Unit (FARU): 14- and 70-day 6º HDTBR
- NASA standard HDTBR screening procedures (healthy adults)

STANDARDIZED CONDITIONS

✓ Subject to rest in bed at all times
✓ Monitoring by a subject monitor and an in room camera
24 hrs a day
✓ Daily measurement of vital signs, body weight, fluid intake and fluid output
✓ No napping permitted between 6:00 am and 10:00 pm
✓ Standardized diet

RESULTS

- 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; None
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