Subjects' closest pre-bed rest observations were between 3 and 6 days pre-bed rest. Subjects' closest post-bed rest observations were between 2-3 days post.

**BACKGROUND**

- Ocular changes such as visual impairment and intracranial pressure (VIP) have been observed in astronauts returning from long-duration spaceflight.
- Changes may be attributed to the shift in body fluids due to microgravity. It remains to be determined whether 6° head-down bed rest is a good analog for VIP.

**Visual Impairment and Intracranial Pressure (VIP) Syndrome:**
May include the following symptoms:

- Hyperopic shift
- Cotton wool spots
- Choroidal folds
- Optic nerve sheath distention
- Edema of the optic disc (papilledema)
- Globe flattening

**Bed Rest Platform:**

- 6° head-down-tilt (HDT) bed rest

**Nomenclature**

- Pre-bed rest phase: BR -14 to BR -1 for control subjects, BR -21 to BR -1 for exercisers
- In-bed rest phase: BR1 to BR70
- Post-bed rest phase: BR-0 to BR+13

**NASA Flight Analogs Research Unit (FARU) Standardized Conditions:**
- During in-bed phase: subject reclined and monitored 24 hours/day
- Vitals, body weight, fluid intake/output measured daily
- Awake time: 6:00 AM – 10:00 PM
- Standardized diet to maintain weight within 3% of initial weight

**RESULTS**

For the following variables, “Pre/Post” was defined as the CLOSEST Pre and Post observations to bed rest. Other in-bed time points were also utilized:

- Subjects’ closest pre-bed rest observations were between 3 and 6 days pre-bed rest.
- Subjects’ first bed rest observation was usually day 3 of bed rest (BR3).
- Subjects’ mid-bed rest observation was usually day 30 of bed rest (BR30).
- Subjects’ last bed rest observation was usually day 65 of bed rest (BR65).
- Subjects’ closest post-bed rest observations were between 2-3 days post.

**DISCUSSION**

Although statistically significant changes were found, none were clinically relevant.

- Both far and near best corrected visual acuity (BCVA) improved from pre-BR to post-BR. We speculate that this may be due to the learning effect of using the visual chart weekly during the study.
- Spherical equivalent decreased significantly from pre-BR to post-BR with both the Retinomax and Reichert device, which indicates a slight shift to myopic biometrics, which might be due to adjustment to near-vision activities during bed rest confinement.
- Reichert device is non-handheld and only used pre- and post-BR.
- There was a significant increase in IOP from pre-BR to all in-BR and post-BR time points.
- This increase in IOP associated with the positional change may be reversible with more time in the post-bed rest phase.
- Average retinal nerve fiber layer (RNFL) thickness by Spectralis OCT increased significantly from pre-BR to post-BR.
- Possibly due to interstitial edema from fluid redistribution.

**CONCLUSION**

- Although no clinically relevant changes have been observed, IOP increase and thickening of the retina due to fluid redistribution in bed rest justify further investigation of HDT bed rest as an analog to model and study the VIP syndrome.

**ACKNOWLEDGEMENTS**

NASA Flight Analogs Research Unit (FARU) personnel, NASA Flight Analogs Project funding 516724.03.04.01

**DISCLOSURE**

Taibbi, G None; Cromwell, RL None; Zanello, SB None; Yarbough, PO None; Vizzeri, G None