**Supplementary Materials:**

# Impaired attentional processing during parabolic flights

Friedl-Werner, A. 1,2, Machado, M.L. 2, Balestra C.3,4, Liegard, Y 2., Philoxene B. 2, Brauns, K. 1, Stahn A.C. 1,5, Hitier, M. 2,6,7, Besnard, S. 2,8

1Charité – Universitätsmedizin Berlin, a corporate member of Freie Universität Berlin, Humboldt-Universität zu Berlin, and Berlin Institute of Health, Institute of Physiology, Charitéplatz 1, CharitéCrossOver, Virchowweg 6, 10117 Berlin, Germany

2Université de Normandie, INSERM U 1075 COMETE, Caen, France

3Environmental, Occupational & Ageing “Integrative Physiology” Laboratory, Haute Ecole Bruxelles-Brabant, Brussels, Belgium

4DAN Europe Research Division (Roseto (It)-Brussels (B))

5Unit of Experimental Psychiatry, Department of Psychiatry, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA 19104, USA

6Centre Hospitalier Universitaire de Caen Normandie, Department of Otolaryngology Head and Neck Surgery, Caen, France

7Université de Normandie, Department of Anatomy, Caen, France

8Aix Marseille Université, CNRS, UMR 7260, Laboratoire de Neurosciences Sensorielles et Cognitives - Equipe Physiopathologie et Thérapie des Désordres Vestibulaires, Marseille, 13000 France, phone: +33 677978649, +33 23106 53 32

**Supplementary Tables**

**Table S1**. Acceleration data of the hypogravity phases for parabolas 11 to 15 and 26 to 30 for each flight day and for each axis respectively.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Flight day I** | | | **Flight day II** | | | **Flight day III** | | |
|  | x-axis | y-axis | z-axis | x-axis | y-axis | z-axis | x-axis | y-axis | z-axis |
| **P11** | -0.013  (-0.037 – 0.012) | -0.004  (-0.014 – 0.006) | 0.006  (-0.022 – 0.037) | -0.010  (-0.035 – 0.020) | -0.004  (-0.014 – 0.006) | 0.002  (-0.029 – 0.078) | -0.010  (-0.031 – 0.010) | -0.005  (-0.016 – 0.002) | 0.003  (-0.023 – 0.090) |
| **P12** | -0.011  (-0.035 – 0.008) | -0.004  (-0.020 – 0.006 | 0.006  (-0.023 – 0.094) | -0.011  (-0.037 – 0.016) | -0.005  (-0.016 – 0.008) | 0.008  (-0.014 – 0.065) | -0.010  (-0.031 – 0.012) | -0.005  (-0.018 – 0.002) | 0.008  (-0.016 – 0.096) |
| **P13** | -0.010  (-0.031 – 0.013) | -0.003  (-0.012 – 0.004) | 0.009  (-0.006 – 0.074) | -0.010  (-0.031 – 0.016) | -0.004  (-0.014 – 0.006) | -0.005  (-0.027 – 0.078) | -0.011  (-0.035 – 0.012) | -0.005  (-0.016 – 0.002) | 0.010  (-0.012 – 0.084) |
| **P14** | -0.010  (-0.035 – 0.014) | -0.004  (-0.016 – 0.002) | 0.005  (-0.012 – 0.090) | -0.009  (-0.037 – 0.016) | -0.004  (-0.010 – 0.002) | 0.006  (-0.004 – 0.080) | -0.010  (-0.031 – 0.008) | -0.005  (-0.022 – 0.008) | 0.004  (-0.014 – 0.084) |
| **P15** | -0.009  (-0.033 – 0.016) | -0.004  (-0.020 – 0.010) | 0.004  (-0.012 – 0.096) | -0.008  (-0.027 – 0.016) | -0.005  (-0.010 – 0.000) | 0.000  (-0.027 – 0.078) | -0.009  (-0.029 – 0.020) | -0.004  (-0.021 – 0.006) | 0.009  (-0.010 – 0.066) |
| **P26** | -0.011  (-0.039 – 0.012) | -0.003  (-0.018 – 0.012) | -0.002  (-0.027 – 0.059) | -0.009  (-0.027 – 0.016) | -0.003  (-0.012 – 0.006) | 0.009  (-0.010 – 0.074) | -0.008  (-0.037 – 0.022) | -0.003  (-0.010 – 0.008) | 0.002  (-0.023 – 0.082) |
| **P27** | -0.011  (-0.035 – 0.012) | -0.005  (-0.018 – 0.006) | 0.001  (-0.012 – 0.059) | -0.009  (-0.033 – 0.012) | -0.003  (-0.014 – 0.006) | 0.006  (-0.016 – 0.082) | -0.009  (-0.031 – 0.020) | -0.002  (-0.014 – 0.012) | 0.004  (-0.014 – 0.088) |
| **P28** | -0.006  (-0.027 – 0.022) | -0.002  (-0.006 – 0.006) | 0.007  (-0.025 – 0.074) | -0.009  (-0.033 – 0.016) | -0.003  (-0.010 – 0.004) | 0.004  (-0.021 – 0.084) | -0.009  (-0.035 – 0.018) | -0.002  (-0.010 – 0.006) | 0.005  (-0.008 – 0.059) |
| **P29** | -0.010  (-0.031 – 0.016) | 0.000  (-0.018 – 0.014) | 0.006  (-0.010 – 0.090) | -0.010  (-0.037 – 0.018) | -0.004  (-0.012 – 0.006) | 0.008  (-0.018 – 0.082) | -0.008  (-0.029 – 0.018) | -0.002  (-0.012 – 0.004) | 0.005  (-0.014 – 0.066) |
| **P30** | -0.007  (-0.027 – 0.018) | -0.004  (-0.014 – 0.008) | 0.001  (-0.033 – 0.078) | -0.010  (-0.033 – 0.018) | -0.004  (-0.010 – 0.004) | -0.006  (-0.039 – 0.080) | -0.009  (-0.029 – 0.014) | -0.003  (-0.012 – 0.004) | 0.007  (-0.012 – 0.094) |

P, number of parabola; x-axis, Gx acceleration from tail to front of the aircraft; y-axis, Gy acceleration from left to right wings; z-axis, Gz acceleration from floor to ceiling. Data is presented as mean (averaged over 22 seconds) and range (minimum – maximum) for each parabola when participants completed a continuous performance task.

**Table S2**. Contrasts comparing the different points in time (Pre-flight, 1 g before P0, 0 g, 1 g after P30, and Post-flight) on CPT performance characteristics (Reaction Time, Hit Rate, False Alarm Rate, d’).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Contrast** | **Variable** | **Estimate** | **SE** | **DF** | ***t*** | ***P*** | **Effect Size (95% CI)** |
| 1 g before P0 - Pre-flight | RT | 91.00 | 30.5 | 43.2 | 2.98 | 0.019 | 0.86 (0.18, 1.52) |
| Hits | -6.43 | 2.2 | 43.1 | -2.93 | 0.016 | -0.85 (-1.50, -0.17) |
| FA | 4.49 | 1.2 | 42.9 | 3.66 | 0.002 | 1.06 (0.33, 1.76) |
| d’ | -0.57 | 0.1 | 42.9 | -4.31 | <0.001 | -1.25 (-1.99, -0.47) |
| 0 g - Pre-flight | RT | 78.58 | 30.5 | 43.2 | 2.58 | 0.040 | 0.74 (0.09, 1.37) |
| Hits | -11.19 | 2.2 | 43.1 | -5.11 | <0.001 | -1.47 (-2.29, -0.63) |
| FA | 5.77 | 1.2 | 42.9 | 4.71 | <0.001 | 1.36 (0.55, 2.14) |
| d’ | -0.87 | 0.1 | 42.9 | -6.54 | <0.001 | -1.89 (-2.84, -0.91) |
| 1 g after P30 -  Pre-flight | RT | 4.57 | 31.2 | 43.7 | 0.15 | 0.919 | 0.04 (-0.52, 0.61) |
| Hits | -2.58 | 2.2 | 43.7 | -1.15 | 0.514 | -0.33 (-0.91, 0.26) |
| FA | 0.66 | 1.3 | 43.3 | 0.52 | 1.000 | 0.15 (-0.42, 0.72) |
| d’ | -0.19 | 0.1 | 43.3 | -1.43 | 0.321 | -0.41 (-0.99, 0.19) |
| Post-flight -  Pre-flight | RT | 22.75 | 30.5 | 43.2 | 0.75 | 0.919 | 0.22 (-0.36, 0.78) |
| Hits | -1.61 | -2.5 | 43.1 | -0.73 | 0.514 | -0.21 (-0.78, 0.37) |
| FA | 0.43 | 1.2 | 42.9 | 0.35 | 1.000 | 0.10 (-0.47, 0.67) |
| d’ | -0.13 | 0.1 | 42.9 | -0.98 | 0.332 | -0.28 (-0.85, 0.30) |
| 0 g - 1 g before P0 | RT | 12.42 | 30.5 | 43.2 | -0.41 | 0.686 | -0.12 (-0.68, 0.45) |
| Hits | -4.76 | 2.2 | 43.1 | -2.17 | 0.099 | -0.63 (-1.24, 0.01) |
| FA | 1.28 | 1.2 | 43.3 | 1.05 | 0.301 | 0.30 (-0.28, 0.87) |
| d’ | -0.29 | 0.1 | 42.9 | -2.24 | 0.030 | -0.65 (-1.26, -0.01) |
| 1 g after P30 -  1 g before P0 | RT | -86.43 | 31.2 | 43.7 | -2.77 | 0.025 | -0.80 (-1.44, -0.13) |
| Hits | 3.85 | 2.2 | 43.7 | 1.72 | 0.099 | 0.50 (-0.12, 1.09) |
| FA | -3.83 | 1.3 | 43.3 | -3.05 | 0.008 | -0.88 (-1.54, -0.19) |
| d’ | 0.37 | 0.1 | 43.3 | 2.78 | 0.017 | 0.80 (0.13, 1.44) |
| Post-flight -  1 g before P0 | RT | -68.25 | 30.5 | 43.2 | -2.24 | 0.061 | -0.65 (-1.26, -0.01) |
| Hits | 4.82 | 2.2 | 43.1 | 2.20 | 0.099 | 0.64 (0.00, 1.25) |
| FA | -4.05 | 1.2 | 42.9 | -3.31 | 0.006 | -0.96 (-1.63, -0,25) |
| d’ | 0.43 | 0.1 | 42.9 | 3.32 | 0.006 | 0.96 (0.25, 1.63) |
| 1 g after P30 -  0 g | RT | -74.01 | 31.2 | 43.7 | -2.37 | 0.067 | -0.68 (-1.30, -0.04) |
| Hits | 8.61 | 2.2 | 43.7 | 3.84 | <0.001 | 1.11 (0.37, 1.82) |
| FA | -5.11 | 1.3 | 43.3 | -4.07 | <0.001 | -1.17 (-1.90, -0.41) |
| d’ | 0.66 | 0.1 | 43.3 | 4.95 | <0.001 | 1.43 (0.60, 2.23) |
| Post-flight - 0 g | RT | -55.83 | 30.5 | 43.2 | -1.83 | 0.148 | -0.53 (-1.12, 0.09) |
| Hits | 9.58 | 2.2 | 43.1 | 4.37 | <0.001 | 1.26 (0.48, 2.02) |
| FA | -5.34 | 1.2 | 42.9 | -4.35 | <0.001 | -1.26 (-2.01, -0.47) |
| d’ | 0.73 | 0.1 | 42.9 | 5.56 | <0.001 | 1.61 (0.72, 2.46) |
| Post-flight -  1 g after P30 | RT | 18.18 | 31.2 | 43.7 | 0.58 | 1.000 | 0.17 (-0.41, 0.73) |
| Hits | 0.97 | 2.2 | 43.7 | 0.43 | 0.668 | 0.12 (-0.45, 0.69) |
| FA | -0.22 | 1.3 | 43.3 | -0.18 | 1.000 | -0.05 (-0.62, 0.52) |
| d’ | 0.06 | 0.1 | 43.3 | 0.47 | 0.638 | 0.14 (-0.43, 0.70) |

RT, Reaction Time of target stimuli in ms; Hits, Hit Rate (correct reactions to target stimuli) in percentage; FA, False Alarm Rate (reactions to non-targets) in percentage; d’, indicator for task sensitivity. n = 12. *df*, degrees of freedom, *t*, t-ratio; *P*, p-value; Effect size is Cohen’s *d* and the corresponding 95% confidence interval (95% CI). Data is presented as marginal means ± SE and was collected at the following points in time: Pre-flight (30 min after scopolamine injection), inflight at 1 g before the first parabola (1 g before P0), during microgravity (0 g), at 1 g after the last parabola (1 g after P30), and after landing (Post-flight).