Effect of zero gravity on the EEG of hippocampus lesioned and control C57BL/6J mice

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In rodents, the dorsal hippocampus participates in spatial orientation and its activity is associated with oscillations in the 4-10Hz range (theta band) that respond to vestibular input. Changes in the spectral power of the gamma and high gamma bands (30-60Hz and 60-125Hz) indicate attentional reactions to sensory stimuli. We analyzed the EEG of hippocampus-lesioned and control mice undergoing repeated changes of gravitational state (1g-2g-0g-2g-1g). Our results, obtained with wireless EEG devices (Neurologgers), indicate a drastic reduction of the theta band at the beginning of the zero gravity episodes in control mice, coinciding with the abrupt decrease of vestibular input. Surprisingly, this decrease diminishes towards the end of the first session of 31 parabolas ($p<0.05$). Lesioned mice lack latter changes, but express an increase in activity in the gamma and high gamma band, possibly because of increased attention and arousal, respectively ($p<0.001$). These results indicate that control mice habituate to zero gravity, despite the repetitive lack of vestibular input. On the other hand, lesioned mice show a persistently augmented arousal state, indicating a lack of habituation. Overall our results underline the importance of an intact hippocampus for 3D-orientation. Supported by ESA C4000102411.