Influence of vestibular stimulation on executive functions

27. Others

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Purpose

There is growing evidence that patients with peripheral vestibular loss show impairments in non-spatial cognitive domains like executive functioning. However, it is unclear which executive components are affected by vestibular loss and whether there is a causal link between vestibular loss and impaired executive functions. Therefore, the aim of this experiment was to investigate the effect of induced mild vestibular impairment in healthy participants on performance in tasks assessing executive functions.

Methods

Fifty-four participants solved executive tasks twice, before and during simultaneous bilateral bipolar galvanic vestibular stimulation (GVS). Suprathreshold GVS (inducing mild vestibular impairment), subthreshold GVS or sham GVS were applied. Core components of executive functions (working memory, inhibition, cognitive flexibility) were measured with two executive tasks (n-back task, Stroop task).

Results

Results indicate impaired performance in the working memory task during suprathreshold stimulation when compared to the groups receiving subthreshold or sham GVS. Performance in inhibition and cognitive flexibility showed no differences between groups. These results suggest that artificially induced mild vestibular impairment in healthy participants can lead to selective impairments in executive functions.

Conclusions

To investigate the causal influence of vestibular stimulation on the performance in executive tasks in healthy participants helps to explain executive deficits in patients with vestibular loss. Since executive functions are a composite of several distinct functions, it is important to more specifically determine the executive components which are affected by vestibular impairment. This can help to screen patients with vestibular loss, and ultimately provide cognitive training methods that are tailored to their pattern of performance.

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