

Galvanic vestibular stimulation and executive functions

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Patients with peripheral vestibular disease have problems in executive functions but there is not much knowledge about the direct vestibular influence on executive functioning. We used the method of galvanic vestibular stimulation (GVS) to induce a mild vestibular impairment in healthy participants and investigated its effect on core domains of executive functions (inhibition, working memory, cognitive flexibility). Seventy-nine healthy participants solved two executive tasks (n-back task, Stroop task) twice, first as a baseline measure and then again during the application of bilateral bipolar sinusoidal GVS. Participants were randomly assigned to three different stimulation protocols: 1.) Suprathreshold GVS (2mA) to induce the vestibular impairment, 2.) subthreshold GVS (0.8mA) or 3.) sham GVS (0mA). Participants receiving suprathreshold GVS showed an impaired performance in the working memory task whereas participants in the subthreshold GVS or the sham GVS group did not show an impaired working memory performance. Inhibition and cognitive flexibility performance did not differ between groups. Our results show that artificially induced vestibular impairment leads to a selective negative effect on working memory performance. This knowledge can help to understand executive deficits in patients with peripheral vestibular disease and should guide new treatment options.