The enhancement of postural control induced by galvanic vestibular stimulation

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Objectives: To investigate 1) the sustained effect of nGVS on postural stability using a control condition and 2) the effect of current density on postural stability by assessing the influence of electrode size.

Background: Noisy galvanic vestibular stimulation (nGVS) has been shown to enhance postural stability during stimulation, and the enhancement has been observed to persist post-stimulation. However, these effects were observed without proper control (sham condition) and the possibility of experimental bias has not been ruled out. Moreover, there is no consensus on the optimal stimulation parameters and as such the methods used vary widely between studies. Notably, the influence of current density, defined as current intensity divided by electrode size, is still unknown.

Methods: A total of 64 adults were recruited. 28 participated in the first experiment and received either nGVS or a sham stimulation. Static postural control on a foam surface with eyes closed was examined before stimulation, after 30 minutes of nGVS and one-hour post-stimulation. 36 subjects were enrolled in the second experiment and they were randomly assigned to one of the two stimulation (35 cm2; 3 cm2) groups or to the control group. Static postural control on a foam surface with eyes closed was assessed prior to stimulation and following 30 minutes of stimulation.

Results: Results of both experiments suggest that current density modulates the enhancing effect of nGVS, however the sustained effect of nGVS remains to confirm. The present results highlight the necessity to have a control condition to rule-out experimental bias.

Conclusions: These findings highlight the importance of a sham condition as well as current density in the exploration of nGVS effect of postural control. However, the influence of numerous other parameters and variables, such as the vestibular function, on the effect of nGVS are still unknown.