

Conclusion Les données révèlent l'importance d'une condition contrôle et l'influence de la densité du courant sur le contrôle postural lors de l'application de la SVG. D'autres études sont nécessaires pour examiner l'influence de d'autres variables, tel que l'état de la fonction vestibulaire, sur l'effet de la SVG à court et à long terme.

Mots clés Stimulation vestibulaire galvanique ; Système vestibulaire ; Contrôle postural

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Large body sways help maintaining balance by increasing the transmission of cutaneous input following prolonged periods of reduced body oscillations: EEG, microneurography and behavioral evidence

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Introduction Important for balance control, the activation of the cutaneous foot receptors largely depends on the speed and amplitude of the body oscillations during standing.

Material and methods Here, we tested the hypothesis that the transmission of cutaneous inputs to the cortex is reduced during prolonged intervals of small body sways due to continued local skin compression and that under such circumstances, central mechanisms trigger large sways to reactivate the cutaneous receptors. We compared the amplitude of the somatosensory cortical potentials (P50-N90) evoked by electric stimulations of the foot sole during either small or large sways in 16 adults that were standing still with the eyes closed.

Results We found greater P50-N90 amplitude when the stimulation occurred during large body sways, consistent with an increased sensory transmission. Importantly, body oscillations computed 200ms prior to large sways had smaller amplitude than intervals that were not followed by large sways.

Discussion The hypothesis of a depressed sensory transmission during continued skin compression was supported by our microneurographic recordings showing adaptation/suppression of tactile fibres discharge during continuous pressure applied to the mechanoreceptors. Finally, the hypothesis that large sways during standing correspond to a self-generated functional behaviour to release skin compression is supported by cortical source and EMG analyses showing respectively that large sways were preceded by activation of cortical areas known to be engaged in motor planning (supplementary motor area and dorsolateral prefrontal cortex) and by ankle muscle activations. Together, the present findings provide evidence for an important sensory function of large body sways for balance control.

Keywords Posture; Somatosensory evoked potentials; EEG; Source localization; Cutaneous receptors; Balance control

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Atelier—Cognition & systèmes sensoriels

Visuomotor control of complex locomotor tasks in physical and virtual environments



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Introduction The successful execution of complex locomotor tasks such as steering and avoiding a collision with other pedestrians are pre-requisites for safe and independent community ambulation. While the successful completion of such tasks heavily relies upon the sense of vision, the specific visual cues employed and associated patterns of gaze and body movement coordination remain poorly understood. Furthermore, the extent to which gaze and body movements are modified by the addition of a concurrent task (i.e. dual-task walking) is unclear.

Material and methods Healthy young and older participants were assessed while walking in physical and/or virtual community environments as they steered toward a goal while avoiding other pedestrians. The walking task in the virtual environment was performed with and without a concurrent cognitive task (auditory or visual).

Results Dual vs. single-task walking resulted in slower walking speed, reduced pedestrian clearance, subtle modifications in gaze-body coordination and an altered pattern of gaze fixation on approaching pedestrians. Concurrent tasks in the visual vs. audio modality resulted in larger locomotor alterations. Dual-task walking led to further collisions with approaching pedestrians and different patterns of gait adaptation in older adults compared to young adults.

Discussion and conclusion Results suggest that the addition of a secondary task while walking impacts on the visuomotor control involved in complex locomotor tasks, as required for independent community walking, with larger alterations being observed in older vs. young adults. Future research will look at the effects of practice on gaze-body coordination in a dual-task walking activity.

Keywords Visuomotor control; Locomotor tasks; Physical and virtual environments

Disclosure of interest The authors declare that they have no competing interest.

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