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TITLE: Effects of Practicing Tandem Gait with and without Trunk-Tilt Biofeedback in Subjects with Unilateral Vestibular Loss

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ABSTRACT BODY:

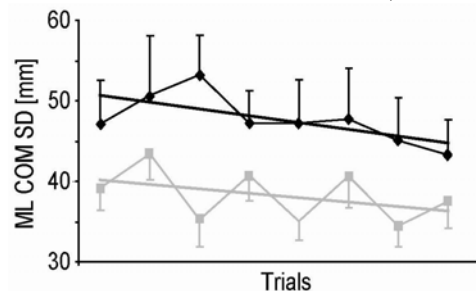
Introduction: Biofeedback (BF) devices have been showed to improve postural control, especially when sensory information is limited by environmental conditions or pathologies such as unilateral vestibular loss (UVL). However, the extent to which BF could improve motor performance or learning while training a dynamic task such as narrow gait is still unknown.

Methods: 9 UVL subjects performed 2 practice sessions consisting of 24 tandem gait trials while wearing a trunk-tilt BF device (C. Wall III, 2001). Subjects were asked to take 1 step for each beat from a metronome (30beats/min) with eyes closed. Subjects were divided into 2 groups. The 1st/2nd group performed the 1st/2nd session with the BF turned on and the 2nd/1st off. When the BF was on, it vibrated up the side of subjects' torso, depending on the amplitude and velocity of their medial-lateral trunk tilt. From motion analysis and tilt data 1) the standard deviation (SD) of the trunk-tilt (indicator of use of BF), 2) the SD of the center of mass displacement (indicator of stability), and 3&4) the variability of stepping placement and the frequency of stepping errors (indicators of accuracy in performing tandem gait) were calculated.

Results: By practicing tandem gait, subjects reduced their trunk-tilt SD, center of mass SD, variability of stepping, and frequency of stepping error. In both groups, use of BF consistently increased postural stability during tandem gait. After practicing with BF, only the stepping frequency parameter was still significantly reduced compared to its value before the BF practice session.

Conclusions: Use of tactile BF consistently improved performance of a dynamic locomotor task in patients with UVL. However, one session of practice with BF does not result in many after-effects consistent with retention of motor performance without this additional BF. Tactile BF acts similar to natural sensory feedback in reducing sensory noise to improve dynamic motor performance and not as a method to recalibrate motor performance to improve function after short-term use.

KEYWORDS: Vestibular disorder, Locomotion, Prosthetics, Learning. (No Table Selected)



Effect of practicing tandem gait overtime without BF (black) and with BF (grey). Each value represents the mean among 9 subjects of 3 consecutive trials.

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