

עורכת: ד"ר מיכל אהרוןוביץ, החוג לפיזיותרפיה, מכללת צפת  
אישורים לפרסום התקציריהם התקבלו מההוציאות לאור של כתבי העת.

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## **Balance maintenance as an acquired motor skill: Delayed gains and robust retention after a single session of training in a virtual environment.**

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### **Abstract**

Does the learning of a balance and stability skill exhibit time-course phases and transfer limitations characteristic of the acquisition and consolidation of voluntary movement sequences? Here we followed the performance of young adults trained in maintaining balance while standing on a moving platform synchronized with a virtual reality road travel scene. The training protocol included eight 3 min long iterations of the road scene. Center of Pressure (CoP) displacements were analyzed for each task iteration within the

training session, as well as during tests at 24h, 4 weeks and 12 weeks post-training to test for consolidation phase ("offline") gains and assess retention. In addition, CoP displacements in reaction to external perturbations were assessed before and after the training session and in the 3 subsequent post-training assessments (stability tests). There were significant reductions in CoP displacements as experience accumulated within session, with performance stabilizing by the end of the session. However, CoP displacements were further reduced at 24h post-training (delayed "offline" gains) and these gains were robustly retained. There was no transfer of the practice-related gains to performance in the stability tests. The time-course of learning the balance maintenance task, as well as the limitation on generalizing the gains to untrained conditions, are in line with the results of studies of manual movement skill learning. The current results support the conjecture that a similar repertoire of basic neuronal mechanisms of plasticity may underlay skill (procedural, "how to" knowledge) acquisition and skill memory consolidation in voluntary and balance maintenance tasks.

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## Light touch and medio-lateral postural stability during short distance gait.

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### Abstract

While standing, light fingertip touch on an external stable object attenuates sway and improves balance in healthy adults as well as in individuals with poor postural control. The effect of light touch on balance during gait is, however, not well known. Therefore, the purpose of this work was to study the effects of light fingertip touch on balance during gait. We hypothesized that similar to its effect during stance light touch would increase postural stability. Forty healthy young adults were tested under four gait conditions: (1) eyes open (EO), (2) eyes closed (EC), (3) eyes closed while lightly touching a static object on the right side of the walking lane (ECLTS), (4) eyes closed while lightly touching a dynamic object, namely, a stick that was moved forwards by the subject with the right hand (ECLTD). The main outcome measure was medio-lateral step width variability, a well established indicator of gait balance in the medio-lateral plane. During the EC condition, light touch of an external static object (ECLTS) decreased medio-lateral variability (i.e., balance improved); however, this stabilizing effect was not observed with light touch on the stick. The availability of self positional and spatial cues when touching a static external reference, and their absence when touching a stick that is moved forwards by the subject as he walks, can explain the different effects of light touch in the ECLTS vs the ECLTD gait conditions.

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## Therapeutic effects of functional electrical stimulation on gait in individuals post-stroke.

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### Abstract

Functional electrical stimulation (FES) to lower extremity (LE) muscles is used by individuals post-stroke as an alternative to mechanical orthotic devices during gait or as a training modality during rehabilitation. Technological developments which improve the feasibility, accessibility and effectiveness of FES systems as orthotic and training devices, highlight the potential of FES for rehabilitating LE function in individuals post-stroke. This study presents a systematic review of the carryover effects of LE FES to motor performance when stimulation is not applied (therapeutic effects) in subjects post-stroke. A description of advances in FES technologies, with an emphasis on systems designed to promote LE function is included, and mechanisms that may be associated with the observed therapeutic effects are discussed. Eligible studies were reviewed for methodological quality, population, intervention and outcome characteristics. Therapeutic effects of FES were consistently demonstrated at the body function and activity levels when it was used as a training modality. Compared to matched treatments that did not incorporate FES, no definite conclusions can be drawn regarding the superiority of FES. When FES was used as an alternative to an orthotic device, it had no superior therapeutic effects at the activity level, yet patients still seemed to prefer it.