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• 計畫英文名稱	An FES System with COG-Feedback Control for Hemiplegia on Balance Training
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中文摘要

身體半側偏癱者，患側下肢肌肉常因肌力減弱張力異常等現象，使得平衡運動控制能力不良，造成下肢兩側的載重不平均，重心轉移能力不良，影響患者行走轉位的安全與效益。有鑑於此，本研究研發並測試平衡訓練系統，觀察受測者於力板上二維壓力重心(center of pressure；COP)，並將微型加速度計加入整個控制系統的平衡訓練中，由圖形的紀錄與即時重心視窗顯示，分析 COP 與 COG 兩者軌跡方向的相關性。本研究所設計的控制系統經測試，得到初步結果；由正常人前後兩次分別測試結果，驗證本系統具有極高的再現性，此一說明確認本系統於臨床研究之測試結果上的可靠性。在臨床測試上將偏癱病患分爲視覺迴饋組與視覺迴饋加電刺激組，並針對兩組在訓練前後(1)重心轉移能力(2)COP 移動最遠距離(3)患側載重能力之改善程度進行評估比較，發現經過兩週由治療師在旁指導的平衡訓練後，視覺迴饋組與視覺迴饋加電刺激組皆有改善，而在訓練後平衡控制進步幅度的比較上，其視覺迴饋加電刺激組的進步幅度較視覺迴饋組有顯著的差異。從問卷調查中病患認爲電刺激對於自身平衡控制的恢復程度有實質上的改善。

英文摘要

For the hemiplegics, the muscle strength decrease and tone abnormality usually disturb the balance and interfere with the ambulation safety and efficacy. In this study , a micro accelerometer is integrated with a self-developed COP feedback control functional electrical stimulation (FES) balance training system. This system can capture both the trajectory of 2-dimensional center of pressure(COP) and center of gravity(COG) in real time and 3-dimensional trajectory with time variation for the hemiplegic . All of the

information and data can be represented in the forms of graphical demonstrations. The relations between the COP and the COG trajectory are investigated. The results of system testing showed that the reproducibility is fine. The hemiplegic patients were divided into Visual Feedback group (Gr V) and Visual Feedback + FES group (Gr V+FES) in the clinical experiment. To evaluate the training effects, the measurements including (1)weight-transfer capabilities (2)COP maximum displacement and (3)affected side loading were conducted. The results showed that the Gr V and Gr V+FES were improved after 2-week training. The improvements are more prominent in Gr V+FES than in Gr V. Otherwise, the questionnaire also showed a similar result. All of the result demonstrates that the self-developed prototype balance training system is reliable and effective.