

Physical therapists use rehabilitation technology such as robotic assisted gait training and functional electrical stimulation to facilitate normal gait for patients with neurological disorders. Evidence has shown that the use of technology can affect neuroplastic changes in the brain and spinal cord. This course will explain the following: 1) the principles of neuroplasticity, 2) how to apply the principles to patients in daily treatments with task specific training and 3) review new technology and evidence to support its use in the practice of physical therapy; This presentation will also provide clinical examples to support the use of Lokomat gait training and functional electrical stimulation. Functional electric stimulation devices will be demonstrated.

Learning Objectives:

1. Describe the principles of neuroplasticity
2. Apply principles of neuroplasticity to the treatment of patients with neurological deficits
3. Identify rehabilitation technology and its use in the treatment of patients with neurological deficits
4. Describe traditional versus conventional treatment of patients with neurological deficits.
5. Design a treatment program using conventional treatment methods
6. Describe the benefits of using functional electrical stimulation and robotic assisted gait training for patients with neurological deficits.

Key References (limit 15):

1. Behrman AL, Bowden MG, Nair PM. Neuroplasticity after spinal cord injury and training: An emerging paradigm shift in rehabilitation and walking recovery. *Physical Therapy* 2006; 86 (10): 1406-1425.
2. Blicher, Jakob, Nielsen, Jorgen. Cortical and spinal excitability changes after robotic gait training in healthy participants. *Neurorehab and Neural Repair*. 2009; 23(2): 143-9.
3. Dunning, K; Black, K.; Harrison, Andrea.; McBride, K.; Israel, S.; Neuroprosthesis Peroneal Functional Electrical Stimulation in the Acute Inpatient Rehabilitation Setting: A Case Series. *Physical therapy*. 2009; 89(5), 499-506.
4. Forrester LW. Exercise mediated locomotor recovery and lower limb neuroplasticity after stroke. *Journal of Rehabil Research and Development*. 2008; 45 (2): 205-20.
5. Laufer, Yocheved Hausdorf, Jeffrey M.; Ring, Haim. Effects of a Foot Drop Neuroprosthesis on Functional Abilities, Social Participation, and Gait Velocity. *American Journal of Physical Medicine & Rehabilitation*. 2009; 88(1): 14-22.

6. Morrison SA, Backus D. Locomotor training: Is translating evidence into practice financially feasible? JNPT 2007; 31: 50-54.
7. Kezar, Trisha M., Perumal, et al. Novel Patterns of Functional Electrical Stimulation have an Immediate Effect on Dorsiflexor Muscle Function During Gait for People Poststroke. Physical Therapy. 2010; 90: 55-66.
8. Nudo RJ. Role of cortical plasticity in motor recovery after stroke. Neurology Report. 1998; 22 (2): 61-67.
9. O'Sullivan. Physical Rehabilitation. New York: 2006.
10. Paul L, Rafferty D, Young S, Miller L, Mattison P and. McFadyen A: The effect of functional electrical stimulation on the physiological cost of gait in people with Multiple Sclerosis. Multiple Sclerosis 2008; 14(7): 954-60.
11. Robbins, Shawn M, Houghton, et al. The Therapeutic Effect of Functional and Transcutaneous Electrical Stimulation on Improving Gait Speed in Stroke Patients: A Meta-Analysis. Archives of Physical Medicine & Rehabilitation. 2006; 87: 834-859.

Speaker Credentials/ Bio: (Limit 100 words)

Wendy Scutt, PT, DPT graduated with her doctorate in PT from Ithaca College in 2006. She is currently working as an outpatient physical therapist at Gaylord Hospital. From 2007- 2010 she worked at Mount Sinai Rehabilitation Hospital in the inpatient rehabilitation department. She is certified in Lokomat technology and worked with the Lokomat while at Mount Sinai. She is currently working on a research project titled "The Burden of Gait Training by Physical Therapists." She is an adjunct professor at University of Hartford assisting with Exam and Eval Lab and Cardiopulm Labs. She currently holds the position of Northwest District Vice Chair in the CPTA and is a member of the programming committee.

Joan Karpuk, PT, MBA, ATP has been a P.T. for over 30 years spending most of her career treating patients with neurological deficits. She is presently working in the outpatient department at Mount Sinai Rehabilitation Hospital and The Mandell Center for Multiple Sclerosis and Neuroscience. She obtained her BS in Physical Therapy from The University of Pennsylvania and her MBA with a concentration in Health Care Administration from Rensselaer at Hartford. She is certified in the fields of assistive technology, Lokomat technology, NDT and ACBIS. She has been a clinical instructor for 34 years and has worked with local physical therapy programs as an adjunct professor, clinical supervisor and in a research project.. She has been involved in sports for the disabled since 1982 as a classifier and coach; She has coached swimming, quad rugby and adaptive rowing on the local, regional, national and international levels.