NEUROLOGICAL REHABILITATION, PLASTICITY AND ACTIVITY–MEDIATED ASPECTS: A ROLE FOR LOCOMOTOR GENERATING ACTIVITY AND THE RESIDUAL POTENTIAL ON SCI INDIVIDUALS THROUGH FES WALKING?

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New scientific work has given the idea of a grown potential to reduce the neurological impairments and functional disabilities of people with SCI (spinal cord injury). As a result patients and families have become forceful advocates for SCI cure. This has posed a challenge for ETHICS compelling researchers and clinicians to promise only for concrete results.

Developmental & experimental neurobiology has enable axons to grow and stem cells to differentiate and migrate. We are learning about the flexibility and plasticity of the sensorimotor system above and below the level of spinal injury [brain-spinal cord-motor unit], and about the residual activity of muscle-skeleton, bladder, bowel, cardio-respiratory and general autonomic system responses feasible for functional use by a NEW CIRCUITRY and/or by ARTIFICIAL means.

In this paper, we briefly comment the possibilities of CNS plasticity in animals and humans. We describe the sacral sparing theory as a tool for human SCI clinical outcome prognosis related to walking performance. By means of functional electrical stimulation (FES), we show some promising clinical results that can be associated with plasticity in the CNS organization nurturing interesting thoughts about the integration of different systems (below and above the level of injury). We demonstrate that it may be possible for FES to potentiate the effects of the residual potential on chronic SCI subjects to generate a pattern of movement that can be useful for standing, stepping and or cycling.

Dormant long-term SCI residual activity may lose the awareness to support above and below the level of injury activity. The sensorimotor system if properly stimulated may generate activity useful for the functional integration of different systems. In this sense; FES, the awareness learning process and training mediated-activities may open real pathways of communication between the above and below level of injury encouraging us to prepare for structural, methodological and neurophysiological studies to proof for the effectiveness of this mediated-approach proposed as a new neurorehabilitation gaining technique.

Key words: CNS organization and plasticity, functional electrical stimulation, human long-term SCI , locomotor-generated pattern activities, spinal-cord injury.

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