OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Neurology & Therapeutics
June 17-19, 2013 Hilton Chicago/Northbrook, Chicago, USA

Multisegmental motor responses with spinal cord stimulation: Spinal cord injuries may have more viable circuitries than seen by clinical or imaging studies

Mohamed A. Sabbahi, Fikreye Ovak-Bittar[1], Selda Uzun[2], Yesim Sengul[3] and Ambia Abdilahi[4]
Texas Woman's University, School of Physical Therapy and Texas Electrophysiology Services, USA

Spinal Cord injuries (SCI) and diseases are a major mainstay in the neurological clinics. Testing and treatment of such disorders and traumas are dependent on clinical evaluation and imaging studies that might miss many viable circuitries which could generate recovered functions if detected in the early stage of the pathology. Electrophysiologic testing such as evoked potentials may evaluate one circuitry/system at a time and could be time consuming and results in answering one question of function. A new approach has recently been developed called Multisegmental Motor Responses (MMR) that can evaluate several spinal circuitries e.g. ascending and descending and direct using single focal spinal stimuli. The purpose of this presentation is to discuss the results of testing patients with SCI of different ASIA classification in order to chart the deficits and viability of different circuits travelled by the MMR. This would result in objective neural assessment of such pathways and circuitries for developing more viable treatment strategies for those patients. MMR of upper and lower limb muscles were recorded in 12 SCI patients (9 ASIA-A, 2 ASIA-B and 0ne ASIA-C). C7 and T11-12 vertebral stimulation were carried out, using percutaneous surface stimulation, while recording evoked muscular responses from upper limbs (ADM, APB, FCR and BB) and lower limbs (Soleus, TA, VMO and MH) using surface EMG. Electrical stimulation and signal recording in the cephalic direction was compared to those travelling in the direct or spinal direction throughout the site of the lesion. Testing was carried out during lying and/or sitting and signal peak-to peak amplitude and deflection latency were the outcome measure. Results showed that 7 out of 9 ASIA-A patients showed signal travelling through the injury site with variable amplitudes to the distal, proximal, right or left, upper and lower limb muscles. Cephalic travelling signal were more preserved than spinally directed signal to lower limbs. This indicates that there are some pathways/fibers that are spared to most of these muscle groups. Two patients with ASIA-A showed no signal travelling through the injury site either in the cephalic or spinal directions. Patients with ASIA-B or C classification showed robust signal travelling in both the ascending (cephalic) and descending (spinal) but a compromised direct input to the limb muscles. These results are not in conformity with ASIA classification and show the needs for developing an electrophysiologic classification of spinal circuitries using MMR in order to develop more effective treatment strategies in patients with SCI.

msabbahi@mail.twu.edu