Spinal automaticity

Automaticity implies that the spinal circuits have some capacity to perform complex motor tasks following the disruption of supraspinal input, and evidence for plasticity suggests that biochemical changes at the cellular level in the spinal cord can be induced in an activity-dependent manner that correlates with sensorimotor recovery. These characteristics should be strongly considered advantageous in developing therapeutic strategies to assist in the recovery of locomotor function following SCI. Rehabilitative efforts combining locomotor training pharmacological means and/or spinal cord electrical stimulation paradigms will most likely result in more effective methods of recovery than using only one intervention [1].

Spinal automaticity of movement control

The significance of the spinal circuitry in controlling postural and locomotor functions largely re-emerged in the mid-1970s under the leadership of Sten Grillner, demonstrating key phenomena of "central pattern generator" and "fictive locomotion" with an evolutionary perspective. These concepts raised the question of how much function can be recovered after paralysis, given the intrinsic automaticity of spinal networks in injured and uninjured states in adults.

A review explores biological mechanisms governing spinal control of movements such as posture and locomotion. They focused on concepts that have evolved from experiments performed over the past decade. Rather than a comprehensive review of the vast literature on the neural control of posture and locomotion, they focused on the various mechanisms underlying functional automaticity, and their clinical relevance.

They proposed that multiple combinations of sensory mechanoreceptors linked to proprioception generate an infinite number of different sensory ensembles, having species-specific meaning and extensive influence in controlling posture and locomotion. These sensory ensembles are translated as a probabilistic phenomenon into highly specific but indeterminate actions. Therefore, they opined that spinal translation of these ensembles in real-time plays a central role in the automaticity of motor control in individuals with and without severe neuromotor dysfunction [2].

1)
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2)
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