

Sensorimotor Training: The Parallel Intervention to Currents Neurodegenerative Diseases Therapies

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Description

The significance of regular physical activities on health is one area that receives a rare unanimous support from the scientific community. Its beneficial impact has repercussion on most body systems such as metabolic, cognitive and musculoskeletal systems. Moreover, animal and human studies as well as professional clinicians highlighted the potential neuroprotective effects of physical activities.

Newly developed approaches show promising results for all populations and more specifically in the case of neurodegenerative diseases. This is particularly noticeable in neurodegenerative disorders affecting basal ganglia such as Parkinson's and Huntington's diseases. These pathologies are characterized by involuntary movements, tremor and chorea respectively and classically cause motor impairments during locomotor, postural stability limits and postural control tasks. There is also increasing evidence of subclinical deficits in processing and integrating sensory information [1], especially for proprioceptive signals [2].

Unlike Parkinson's disease, Huntington's disease is characterized by a hereditary mutation carrier gene. This provides to clinicians a diagnostic tool for early detection of those who will develop clinical symptoms (preclinical Huntington's disease). Surprisingly, despite this preclinical stage, individuals exhibit postural control as well as stability limits impairments. These abnormalities are exacerbated when the demand to process and integrate proprioceptive signals is increased [3].

Interestingly, studies using mouse models of Huntington's disease revealed that increased sensorimotor stimulations induced by environmental enrichment can have major benefits on this fatal disease by delaying the onset and slowing the progression of associated motor symptoms [4]. This evidence underlines the critical requirements of sensorimotor stimulation even before clinical symptoms onset.

Different types of exercises are proposed as their effects vary on

brain adaptation [5]. Current knowledge supports the implementation of a specific training program that will target sensorimotor abnormalities as it would most likely have a larger beneficial impact on the pathology's progression. There is sufficient evidence to support the implementation of a balance training program when working with these populations. However, limited researches have investigated the effect of specific proprioceptive training in individuals with basal ganglia disorders. According to the recent review conducted by Aman and their collaborators, the most beneficial proprioceptive training program is one that incorporates both passive and active movements, with or without visual feedback [6].

With the current knowledge, it is reasonable to state that Parkinson's and Huntington's diseases, even at the preclinical Huntington's disease stage, would benefit from a specific sensorimotor training program that include dynamic balance and proprioceptive exercises.

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