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Action-based modulations of somatosensory processing in professional musicians with focal hand dystonia: novel insights for neurorehabilitation

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Introduction: Focal task-specific dystonia is a rare movement disorder that may affect musicians while playing instruments. An impaired sensorimotor integration has been shown to explain the impairment of voluntary control of highly-skilled movements in musicians [1,2]. Furthermore, sensory training based on visual input seems able to modulate this pathologic sensorimotor integration playing a key role for rehabilitation [3].

Objective: To determine how somatosensory processing is modulated during variants of a simple hand motor task in musicians affected by focal hand dystonia (FHD).

Methods: We enrolled 5 professional musicians with a selective FHD and recorded somatosensory evoked potentials (SEP) independently from the affected and the non-affected hand in 4 randomized conditions: 1. at rest 2. during a self-paced motor task (i.e. finger tapping) without action observation 3. during motor imagery of the same task 4. during finger tapping with action observation. We analyzed SEP to verify whether they are specifically modulated across different task modalities in the affected compared to the non-affected hand.

Results: A self-paced motor task, such as finger tapping performed without action observation, led to a suppression of SEP amplitude which resulted to be significantly greater in the dystonic hand compared to the control one. The imagery of the same motor task led to a mild SEP attenuation without differences in the two hands. More interestingly, the action observation of the same task seemed effective in attenuating differences between hands due to a milder suppression of SEP in the dystonic hand up to the level of the control hand.

Conclusion: These findings further corroborate the hypothesis for a leading role of somatosensory dysfunction in FHD. Furthermore, the impact of action observation on SEP during a motor task may be interpreted as a novel evidence for explaining the effect of rehabilitation based on mirror therapy in patients with FHD.

References:

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