Changing the Brain through Therapy for Musicians' Hand Dystonia

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ABSTRACT: Focal hand dystonia is a disorder in which sensory and motor anomalies emerge that appear to be grounded in maladaptive routes of cortical plasticity. Remodeling cortical networks through sensory-motor retuning (SMR), we achieved long-term reduction in the symptoms of focal hand dystonia. Magnetoencephalography confirmed that SMR modified the representational cortex of the fingers, whereby the representation of the affected hand was reorganized so that it resembled more the organization of the non-affected side. Furthermore, we observed differences in abnormal tactile acuity between patients with musician's cramp and those with writer's cramp: Using two-point finger discrimination, dystonic musicians showed perceptual asymmetry between hands, while writer's cramp patients did not. To further evaluate the occurrence of collateral disturbances in focal dystonia, we assessed the clinical histories of 101 affected musicians. An important finding from this study was that dystonic musicians who play a similar first and second instrument reported a continuous worsening of their symptoms. In addition, collateral disturbances appeared with a shorter delay when more than one instrument was played. Taken together, these studies suggest that (1) neurological dysfunction can be reversed by context-specific training protocols, (2) specific symptomatic and etiological differences among various forms of focal hand dystonia might result from different behavioral experiences and their central representation, and (3) the spread of symptoms might be prevented by avoiding training that implies movement patterns similar to the main affected task, and by reducing the amount of task-associated movement behavior.

KEYWORDS: focal hand dystonia; sensory discrimination; cortical plasticity; hand rehabilitation

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