Abnormal motor sequence representation in dystonia

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Dystonia is a neurological disorder characterized by involuntary movements and abnormal postures. The abnormal movements may affect multiple body parts or may be isolated to a single body part. Dystonia has been associated with impaired motor learning in sequential tasks. However, it is unclear if impaired motor learning is characteristic of all subtypes of dystonia, and whether differences in motor learning are markers of underlying neural circuit dysfunction, or simply secondary to performance differences.

Musicians with task-specific focal hand dystonia (FHD) (n=9), non-musicians with other forms of dystonia (n=11), and healthy controls (n=30) tapped a finger sequence with changing stimulus-to-response mapping but with an unchanging movement sequence. We instructed subjects to tap the sequences as quickly and accurately as possible but gave no clues to the common motor sequence. Compared to controls, there were no differences in performance measures of inter-tap-interval, temporal consistency, or kinematic consistency in subjects with dystonia. Thirteen (43%) healthy controls had awareness that they were tapping an unchanged movement sequence, but only two subjects with dystonia (10%) demonstrated awareness. In addition, the strength of this awareness was reduced in subjects with dystonia compared to healthy controls.

Reduced sequence awareness in people with dystonia in this motor task is not attributable to differences in key performance measures. These findings suggest that there is a fundamental difference in cognition of motor sequence performance in patients with dystonia, regardless of etiology, and that this impairment is due to neural circuit differences that are independent of motor execution.