

Neural Correlates of Dystonic Tremor: A Multimodal Study

of Voice Tremor in Spasmodic Dysphonia

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Abstract

Tremor, affecting a dystonic body part, is a frequent feature of adult-onset dystonia. However, our understanding of dystonic tremor pathophysiology remains ambiguous as its interplay with the main co-occurring disorder, dystonia, is largely unknown. We used a combination of functional MRI, voxel-based morphometry and diffusion-weighted imaging to investigate similar and distinct patterns of brain functional and structural alterations in patients with dystonic tremor of voice (DTv) and isolated spasmodic dysphonia (SD). We found that, compared to controls, SD patients with and without DTv showed similarly increased activation in the sensorimotor cortex, inferior frontal (IFG) and superior temporal gyri, putamen and ventral thalamus, as well as deficient activation in the inferior parietal cortex and middle frontal gyrus (MFG). Common structural alterations were observed in the IFG and putamen, which were further coupled with functional abnormalities in both patient groups. Abnormal activation in left putamen was correlated with SD onset; SD/DTv onset was associated with right putaminal volumetric changes. DTv severity established a significant relationship with abnormal volume of the left IFG. Direct patient group comparisons showed that SD/DTv patients had additional abnormalities in MFG and cerebellar function and white matter integrity in the posterior limb of the internal capsule. Our findings suggest that dystonia and dystonic tremor, at least in the case of SD and SD/DTv, are heterogeneous disorders at different ends of the same pathophysiological spectrum, with each disorder carrying a characteristic neural signature, which may potentially help development of differential markers for these two conditions.