

Functional and morphological changes of brain structures in patients suffering from musician's dystonia

Eckart Altenmüller¹, Oliver Granert², Martin Peller², Hans-Christian Jabusch³, and Hartwig Siebner^{2,4}

¹ Institute of Music Physiology and Musicians' Medicine, Hanover University of Music and Drama, Germany

² Department of Neurology, University Hospital Schleswig Holstein, Campus Kiel, Germany

³ Institute of Musicians' Medicine, Dresden University of Music Carl Maria von Weber, Germany

⁴ Danish Research Centre for Magnetic Resonance, Hvidovre University Hospital, Copenhagen, Denmark

Focal hand dystonia has been associated with morphometric changes and distorted somatotopic representations in the putamen. Our objective was (1) to test for morphometric alterations of the putamen in pianists with musician's dystonia (MD) relative to healthy pianists without dystonia and (2) to identify structural changes in the basal ganglia that correlate with performance during piano playing. Eleven pianists with MD and 12 healthy pianists without dystonia underwent high-resolution T1-weighted MRI of the whole brain. Additionally, motor performance was investigated in a music-related task according to a protocol previously described as a valid and reliable method to assess motor control in pianists. When playing major scales on the piano, the timing of key strokes was more variable in patients with MD than in pianists without dystonia. Healthy musicians had a smaller grey matter volume in the right middle putamen compared with MD patients. In dystonic and non-dystonic pianists, the middle part of the left and right putamen was smaller in individuals with higher temporal accuracy during piano playing. A smaller associative territory of the motor putamen is a structural marker for manual skillfulness in highly trained pianists. Since this structure-function relationship is preserved in MD, we argue that the relative increase in grey matter volume in this region reflects impaired performance in

dystonic musicians rather than a specific structural substrate of focal hand dystonia.

Keywords: focal dystonia; pianists; basal ganglia; morphometry; performance skill

Address for correspondence

Eckart Altenmüller, Institute of Music Physiology and Musician's Medicine, Hanover University of Music and Drama, Hohenzollernstrasse 47, Hanover 30161, Germany;
Email: altenmueller@hmt-hannover.de