

between patients with BEB and HFS before and after the botulinum neurotoxin (BoNT) therapy.

Background: Benign essential blepharospasm (BEB) and hemifacial spasm (HFS) are the most common movement disorders that affect the face. Despite having similar clinical presentations, the pathophysiology of both conditions is different and not fully understood.

Methods: Cross-sectional and longitudinal 3T 3D-T1 MRI recordings were performed from 13 BEB and 13 HFS patients prior to and one month after BoNT therapy. Voxel based morphometry and graph based network connectivity measures were estimated as parameters for evaluating changes in the grey matter between and within the two groups of patients at two time points.

Results: BoNT therapy improved motor symptoms in patients with BEB and HFS. The BEB group showed a reduced grey matter volume at baseline in the supplementary motor area, middle cingulate, and parietal regions. The grey matter changes after BoNT treatment differed between the groups. In BEB patients a further reduction of grey matter volume was observed in the parietal, frontal and temporal regions. Grey matter volumes increased in the hippocampus and cerebellum. In HFS patients there were no significant grey matter volume changes after BoNT treatment. In the graph theoretical network analysis, the parameters degree and clustering coefficient showed significant differences between the two groups, pointing to a modified regional connectivity pattern between the groups.

Conclusions: Although similar in clinical manifestation, BEB and HFS presented grey matter and connectivity differences. BoNT therapy was associated with selective changes of cortical grey matter volume in the BEB group and not in HFS patients. Moreover the connectivity analyses showed widespread cortical and sub-cortical changes at the regional level. We demonstrate specific disease- and therapy-dependent grey matter integrity and connectivity changes in cortical and sub-cortical morphology following BoNT therapy.

Structural and connectivity changes after botulinum neurotoxin therapy in blepharospasmus and hemifacial spasm

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Objective: The two primary objectives of this study were to investigate the structural grey matter changes and connectivity differences