OPTIMAL CONNECTIONS IN THALAMIC, PALLIDAL & SUBTHALAMIC DBS FOR TOURETTE'S SYNDROME

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Methods

Midline thalamic nuclei (CM/Voi), internal pallidum (GPi) and subthalamic nuclei (STN) are associated with improvement of TS patients after DBS across three targets: CM/Voi, STN and GPi. However, the exact neural pathways responsible for a good clinical outcome remain unclear[4,5]. In this study, we explore the connections between these targets and clinical outcomes measured as the YGTS7 using Spearman coefficients, leading to an R-value per streamline. (Fig.1) Top 100 streamlines were ranked at R = 0.43 (CM/Voi), R = 0.23 (GPi) and R = 0.70 (STN).

Conclusion

We visualized connections associated with maximal improvement of TS patients after DBS based on a multi-centric cohort targeting three different structures: CM/Voi, STN and GPi. Our results suggest that a common target in the pallidothalamic projections (fasciculus thalamicus) is key for symptom improvement in TS-DBS. (Fig. 2) Preoperative and postoperative images were preprocessed using Lead DBS software[6]. Electrodes were localized, and electrical fields (E-fields) were calculated for each patient. Each E-field has varying impact onto each streamline of the Basal Ganglia Pathway atlas[7]. These magnitudes were correlated with clinical outcomes measured as the percent improvement in YGTS7 using Spearman coefficients, leading to an R-value per streamline. (Fig.1) Top 100 streamlines with highest R-values were retained and visualized in Figure 3.

Optimal stimulation sites in subthalamic, pallidal and thalamic DBS for Tourette’s Syndrome converge in the fasciculus thalamicus.