target the brain due to poor understanding of the brain's role post-SCI. Newly developed tissue clearing techniques have permitted unbiased three-dimensional circuit analysis, opening new opportunities for SCI-related brain interrogation. Methods: We established a novel brain interrogation pipeline by optimizing mouse brain clearing, imaging, and atlas registration. We leveraged a spontaneous recovery lateral hemisection model to analyze whole brain cell activity and connectivity with the lumbar cord using cFos immunolabelling and virus-mediated projection tracing. We identified a functionally and anatomically dynamic region correlating with recovery and interrogated its locomotor role with optogenetics. We assessed deep brain electrical stimulation (DBS) of this region in a more clinically relevant rat contusion SCI using an established bipedal robotic interface. Results: We unexpectedly uncovered the lateral hypothalamus (LH) to functionally and anatomically correlate with recovery. LH^{Vglut2} optogenetic stimulation significantly augmented locomotor function. LH DBS in rats acutely robustly augmented bipedal locomotion post-SCI. Conclusions: This is the first demonstration of the LH's role in locomotion post-SCI and is a novel DBS target that robustly augmented locomotor function, dependent on LH glutamatergic cells. LH DBS may be a promising intervention in humans.

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Subnuclear contact localization within the subthalamic nucleus in deep brain stimulation for Parkinson Disease

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Background: Therapeutic response from subthalamic nucleus (STN) deep brain stimulation (DBS) for Parkinson disease (PD) has been associated with proximity to an ideal target, commonly in the dorsal sensorimotor STN. Automated registration and atlas-based segmentation has allowed for contact localization within STN subnuclei. We sought to apply these methods to characterize the spatial distribution of our active contact placements. Methods: We conducted a retrospective analysis of 55 patients who underwent bilateral STN DBS for PD. Post-operative CT/MRI scans were non-linearly registered into a standard space, and DBS-electrodes were localized using Lead-DBS. 3-dimensional meshes from a segmented atlas (Ewert 2017) were utilized. Analysis was performed in MATLAB R2019b. Results: Mean active contacts were within sensorimotor STN bilaterally, located posteroinferiorly compared to reported ideal targets. Centroids fell within (left/right): sensorimotor (46%/40%), associative (22%/22%), limbic (0%/2%) and outside STN (32%/36%). Principal components analysis demonstrated most spatial variance is explained by the first component (left 65.8%, right 61.9%). Conclusions: We obtained contact locations in relation to STN subnuclei, allowing for an anatomically guided approach to our analysis. 66% of the active contacts were located within the STN, and most of the spatial variation occurred along a single dimension. Future directions include utilizing subnuclei localizations to investigate clinical outcomes.

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Cyberknife radiosurgery for trigeminal neuralgia: a retrospective review of 168 cases

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Background: Gamma Knife radiosurgery for the treatment of refractory trigeminal neuralgia is recognized as an efficient intervention. The CyberKnife, a more recent frameless radiosurgery alternative, has not been studied as extensively for this condition. The aim of this study is to evaluate the clinical outcomes of a first CyberKnife radiosurgery treatment on patients with medically refractory trigeminal neuralgia. Methods: A retrospective study of 166 patients (168 cases) with refractory trigeminal neuralgia treated since 2009 with CyberKnife radiosurgery at the Centre Hospitalier de l'Université de Montreal (CHUM). Results: Adequate pain relief (Barrow Neurological Institute (BNI) pain scores I-IIIb) was achieved in 146 cases (86.9%). The median latency period before adequate pain relief was 35 days (range 0-202 days). The median duration of adequate pain relief was 15.8 months (range 0.6-85.0[DR1] [AG2] [AG3] [AG4] months). The actuarial rates of maintenance of adequate pain relief at 12, 36, and 60 months were 77.0%, 62.5%, and 50.2%, respectively. There was a new-onset or aggravation of facial numbness in 44 cases (26.2%). The maintenance of an adequate pain relief was more sustained in idiopathic cases in comparison to cases associated with multiple sclerosis ($P<$ 0.001). Conclusions: In our experience CyberKnife radiosurgery for refractory trigeminal neuralgia is efficacious and safe.

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Radiofrequency rhizotomy for trigeminal neuralgia under general anaesthetic with intraoperative neuromonitoring

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Background: Radiofrequency rhizotomy is an efficacious technique for treatment of trigeminal neuralgia that is classically performed with the patient awake. Previous studies have investigated methods for both anatomic and neurophysiologic optimization for nerve targeting. Methods: We performed a retrospective review of prospectively collected data on patients undergoing radiofrequency rhizotomy under a general anesthetic. Electrodes are placed in the temporalis, masseter and one of mylohyoid or anterior belly of digastric muscles. We then localize of the correct subdivision of the trigeminal nerve. The division of the trigeminal nerve with pain shows a muscle response, which is not present in normal subdivisions. Results: A total of 23 radiofrequency rhizotomies were performed under general anesthetic. Abnormal conduction reflexes were present in all cases, and dissipated after lesioning. Pre-operative BNI pain scores were 4.1 ± 0.3, which dropped to 1.8 ± 1.9 post-op (p=0.003). Number of pain medications (2.9 ± 0.6 v. 1.3 ± 1.3, p=0.007) and number of patients with