the excretory lacrimal apparatus from the lacrimal sac to the nasal fossa. Methods: We will provide an anatomical review of the various structures easily identifiable on CT and MRI and suggestions of the best imaging protocols to be used. Results: The lacrimal apparatus includes the various structures related to the production and flow of tears. In this educational exhibit we will focus on the excretory apparatus from the lacrimal sac to the nasal fossa. We will present various pathologies affecting the excretory lacrimal apparatus with attention to the specific features of each condition to facilitate an appropriate differential diagnosis. We will emphasize specific anatomical/imaging findings to help the diagnosis and propose a standardized reporting system for the Neuroradiologist and useful to the ENT surgeon. Conclusions: This educational exhibit offers a unique opportunity to review the anatomy and pathology of sometimes overlooked or forgotten structures which are however always included in our CT and MRI studies.

Neurosurgery (CNSS)

Functional Neurosurgery and Pain

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Long-term outcomes of radiofrequency ablation for temporal lobe epilepsy

R Wang (London) AG Parrent (London) DA Steven (London) JG Burneo (London) A Suller-Marti (London) JC Lau (London)*

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Background: Radiofrequency ablation (RFA) is a minimally-invasive procedure that has been used to treat temporal lobe epilepsy (TLE), however its long-term efficacy is unknown. We aim to characterize the long-term outcomes of patients from the original series by Parrent and Blume (1999). Methods: Consecutive patients who underwent stereotactic RFA for TLE were retrospectively reviewed. Demographics, procedural details, and seizure outcomes until last follow-up were abstracted. Seizure-freedom after initial RFA treatment was estimated with Kaplan-Meier analysis. Results: 27 patients underwent RFA from 1994 to 2002. There were 14 female (52%) patients. 24 (89%) had mesial temporal sclerosis. Mean age at time of RFA was 33.1 years (range 12-45 years). 17 (63%) patients underwent left-sided RFA. 15 (56%) patients had further interventions: 4 (15%) underwent only repeat RFA, 1 (4%) had repeat RFA and anterior temporal lobectomy (ATL), and 10 (37%) underwent subsequent ATL only. Mean follow-up was 9.0 years (range 0.5-22.7 years). At last follow-up, 16 (59%) patients were seizure-free: 5 (19%) received one RFA treatment and 11 (41%) underwent additional procedures. Conclusions: Based on the original series describing the technique, stereotactic RFA for TLE is a safe, minimally-invasive procedure. The role of stereotactic RFA in the treatment of TLE remains to be determined.

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Reducing artifact during in bi-directional brain interfacing

K Tourigny (Halifax) T Denison (Oxford)*

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Background: Bi-directional brain interfacing (closed loop DBS) is a modern focus of neuroengineering research. Most current clinical systems are open loop, allowing one way communication from the IPG battery to the brain. Bi-directional systems allow both stimulation and recording of neural activity (local field potential, LFP). The system algorithm can measure known pathologic LFPs to guide change in stimulation. However, recording LFPs from the brain encounters electrical artifact from the heart. Reducing artifact is imperative to accurate measurement of neural activity. Artifact will cause the bi-directional system to miscalculate stimulation parameters. This project evaluated reduction of artifact by moving the IPG further away from the heart in a device implanted into the skull. Methods: LFP data from ongoing clinical trials was collected and analysed for artifact using open source code. Anatomic targets include STN, PPN, CMT, and PAG. Results: Cardiac artifact is reduced in skull mounted DBS as shown by power spectral density of LFPs in each region. Conclusions: This project shows the importance of surgical placement of DBS sensing devices to reduce cardiac artifact in bi-directional brain interfacing. This has important engineering and surgical design implications for safety and performance as the field of closed loop DBS transitions from research to clinical settings.

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fMRI-based deep brain stimulation programming: a blinded, crossover clinical trial

B Santyr (Toronto) A Ajala (Niskayuna) I Alhashyan (Toronto) J Germann (Toronto) J Qiu (Niskayuna) A Boutet (Toronto) A Fasano (Toronto) A Lozano (Toronto)*

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Background: Success of deep brain stimulation (DBS) in Parkinson's disease (PD) relies on time-consuming trial-and-error testing of stimulation settings. Here, we prospectively compared an fMRI-based stimulation optimization algorithm with >1 year of standard-of-care (SoC) programming in a double-blind, crossover, non-inferiority trial. Methods: Twenty-seven PD-DBS patients were prospectively enrolled for fMRI using a 30-sec DBS-ON/OFF cycling paradigm. Optimal settings were identified using our published classification algorithm. Subjects then underwent >1 year of SoC programming. Clinical improvement was assessed, after an overnight medication washout period, under SoC and fMRI-determined stimulation conditions. A predefined non-inferiority margin was -5 points on the Unified Parkinson's Disease Rating Scale (UPDRSIII). Results: UPDRSIII improved from 45.3 (SD=14.6) at baseline to 24.9 (SD=10.9) and 24.1 (SD=10.9) during SoC and fMRI-determined stimulation, respectively. The mean difference in scores was 0.8 (SD=8.5; 95% CI -4.5 to 6.2). The non-inferiority