PLATFORM PRESENTATIONS

Adult Neurology (CNS)

A.1

Plasma Chitinase 3-like 1 protein levels in people with Radiologically Isolated Syndrome correlate with choroid plexus volume and subcortical grey matter atrophy

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Background: Radiologically isolated syndrome (RIS) is characterized by incidental MRI findings suggestive of multiple sclerosis in asymptomatic individuals. Emerging blood biomarkers, including neurofilament light chain (NfL), glial fibrillary acidic protein (GFAP), and chitinase 3-like 1 protein (CHI3L1) are promising tools for evaluating neuroinflammation and neurodegeneration. Methods: This cross-sectional analysis included 47 individuals with RIS who underwent MRI and plasma biomarker assessments. Plasma levels of CHI3L1, NfL, and GFAP were measured using highly sensitive assays. Correlations between biomarkers and MRI markers, including T1-black holes (BHs), central vein sign (CVS) positive lesions, paramagnetic rim lesions (PRLs), choroid plexus volume (CPV), and thalamic and hippocampal volumes, were analyzed using linear regression. Results: Plasma CHI3L1 levels correlated with increased CPV ($\beta = 0.347$, $p = 0.017$) and reduced thalamic ($\beta = -0.309$, $p = 0.035$) and hippocampal ($\beta = -0.535$, $p < 0.001$) volumes. Plasma GFAP levels were associated with BHs, CVS, and PRLs, whereas plasma NfL showed no correlations with MRI measures. Conclusions: Plasma CHI3L1 correlates with subcortical grey matter atrophy and CPV increase in RIS, distinct from correlations observed with GFAP or NfL. This suggests that plasma CHI3L1 may reflect neurodegeneration and inflammation in RIS and provide insights into disease activity not captured by other biomarkers.

A.2

Cognitive outcomes of deep brain stimulation depend upon subiculum connectivity

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Background: Recent research has demonstrated that DBS sites in Alzheimer's (AD) and Parkinson's (PD) influencing cognition are functionally connected to the subiculum. However, the results are mixed, and it is unclear how or if DBS site-subiculum connectivity can be optimized to improve patient cognition. Methods: We studied how subiculum connectivity influenced cognitive outcomes in both PD (subthalamic nucleus) and AD (fornix) DBS patients (total n = 110). We first confirmed DBS site-subiculum connectivity had opposite cognitive effects in each disease. We next investigated patient factors underlying these opposing effects. Lastly, we related our findings back to clinical practice to guide DBS programming in PD and AD. Results: DBS site-subiculum connectivity correlated with cognitive improvement in AD but decline in PD. This was dependent upon hippocampal atrophy; such that higher subiculum connectivity was beneficial when the hippocampus was atrophic but deleterious when it was intact. Finally, we related our findings back to anatomy with cadaveric dissections and present how DBS stimulation can be optimized to improve patient cognition. Conclusions: DBS site-subiculum connectivity influences cognition but depends on patient factors. Thus, to optimize cognition based on patient factors, DBS electrodes can be programmed to stimulate subregions with higher or lower subiculum connectivity.

A.3

Comparison of anterior versus posterior circulation stroke patients undergoing thrombectomy: results from the OPTIMISE registry

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Background: Anterior (ACS) and posterior circulation (PCS) stroke patients have different clinical presentations and prognoses, though both benefit from endovascular thrombectomy (EVT). We sought to determine whether ACS and PCS patients treated with EVT differed with regards to treatment metrics and functional outcomes. Methods: We retrospectively analysed the Canadian OPTIMISE registry which included data from 20 comprehensive stroke centers across Canada between January 1, 2018, and December 31, 2022. We performed a descriptive analysis of patients divided in two groups (ACS= carotid artery and its branches, PCS= vertebrobasilar system). Results: Of the 6391 patients included (5929 ACS and 462 PCS), PSC patients were younger (67 vs. 71.3, $p<0.001$), more often male (61.9% vs. 48.6%, $p<0.001$), had longer (in minutes) onset-to-door (362 vs. 256, $p<0.001$), door-to-needle (172 vs. 144, $p=0.0016$), and onset-to-puncture (459 vs. 329, $p<0.001$) times. They were less often thrombolyzed (39.8% vs. 50.4%, $p<0.001$), and more frequently underwent general anesthesia (47.6% vs. 10.6%, $p<0.001$). Successful reperfusion and functional independence at 90 days were similar between the two groups. Conclusions: Patients with PCS had worst treatment metrics than ACS.

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Strategies to improve PCS management times are critical to decrease these disparities, including faster pre-hospital recognition and in-hospital workflows.

A.4

Automating gait analysis in children with Cerebral Palsy using an artificial intelligence-augmented pipeline

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Background: Cerebral palsy (CP) is a neuromotor disorder whereby gait abnormalities are predominant. Motion analysis is instrumental in management. While 3D kinematic labs exist, they are costly to operate, and the expertise required to interpret limits their availability to only a handful of facilities. In response, we have developed an Automated Intelligence (AI) driven pipeline to automate gait evaluation using 2-dimensional video. We assess the performance of this tool in comparison to traditional evaluation using visual assessment by trained human expert. Methods: A dataset of 109 patients with CP (6–37 years) (GMFCS I – II) was processed using our tool. The Edinburgh Visual Gait Score (EVGS) was derived using videos capturing sagittal and coronal views. Algorithm performance was determined by comparing automated EVGS scores against clinical expert scoring. Results: The AI pipeline successfully analysed 105/109 patient videos. For most EVGS parameters (14/17), the algorithm demonstrated moderate to high accuracy (70-94%), while 3 parameters (hindfoot valgus/varus, maximum lateral trunk shift, pelvic rotation at midstance) demonstrated lower accuracy (58-62%). Conclusions: This study validates the feasibility of an AI-augmented pipeline for automating EVGS-based gait assessments. With ongoing development, this technology has potential to improve accessibility to gait analysis and allows deployment outside of traditional settlings.

A.6

The clinical validation of a comprehensive neural autoantibodies testing

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Background: New neural antibodies are being identified each year and determining how to measure them and how to interpret test results is complex. In addition, screening with two methods is recommended for most antibodies, particularly paraneoplastic antibodies. We report the clinical validation and profile of a series of neural autoantibodies detected with a comprehensive testing algorithm. Methods: This is an ongoing study in which we are asking for the clinical correlation and final diagnosis of patients whose serum and/or CSF samples were tested at the BC Neuroimmunology Lab, Vancouver for neural autoantibodies. We performed immunofluorescence screening assay/IHC in rat brain sections in combination with confirmatory fixed or live Cell-Based assays and/or immunoblots. Results: We obtained clinical information from 219 samples (22 positive), Upon clinical inquiry, we obtained clinical information on 12 cases (five positive and seven negative). One Ttitin positive case was associated with anti-acetylcholine receptor antibody myasthenia and one Zic4 antibody was detected as a false positive by immunoblot but was negative by Rat Brain IHC. Conclusions: We have identified 10 percent seropositivity on 219 samples testing for Mosai-6 and full paraneoplastic testing. Further clinical validation studies are ongoing to evaluate the accuracy of our serological testing for neural antibodies.

A.7

A novel Xdystonia-parkinsonism gene variant responsive to bilateral GPi DBS: a video case study

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Background: X-linked dystonia-parkinsonism (XDP) is a rare movement disorder primarily affecting males of Filipino descent characterized by dystonia and parkinsonism. This case illustrates a patient with a novel gene variant responsive to deep brain stimulation (DBS). Methods: Case study of Filipino male with XDP followed for 15 years. Results: A 32-year-old Filipino male presented with oromandibular and cervical dystonia which later generalized. He went on to develop parkinsonism with significant gait impairment, incomprehensible speech, and required PEG tube placement. His symptoms were refractory to pharmacologic therapy. At age 43, he underwent bilateral globus pallidus internus (GPi) DBS placement with significant improvement of his symptoms as illustrated by videos accompanying this report. He had marked improvement of gait, speech, and pharyngeal dystonia resulting in removal of his PEG tube with return to full oral intake. He continues to benefit 3 years after DBS placement. Genetic testing identified a missense hemizygous non-coding transcript exon variant TAF1 n.5776C>T which is a novel gene variant of XDP not previously reported in the literature. Conclusions: This case illustrates a patient with a novel TAF1 gene variant associated with XDP not previously reported in the literature. This variant was responsive to bilateral GPi DBS placement.

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